

PHILOSOPHY OF VOICE

LUNN

"GOD MEND YOUR VOICES"

'AS YOU LIKE IT'

EIGHTH EDITION

Cornell University Library

BOUGHT WITH THE INCOME
FROM THE
SAGE ENDOWMENT FUND
THE GIFT OF
Henry W. Sage
1891

A.95/26

9/7/96

MUSIC

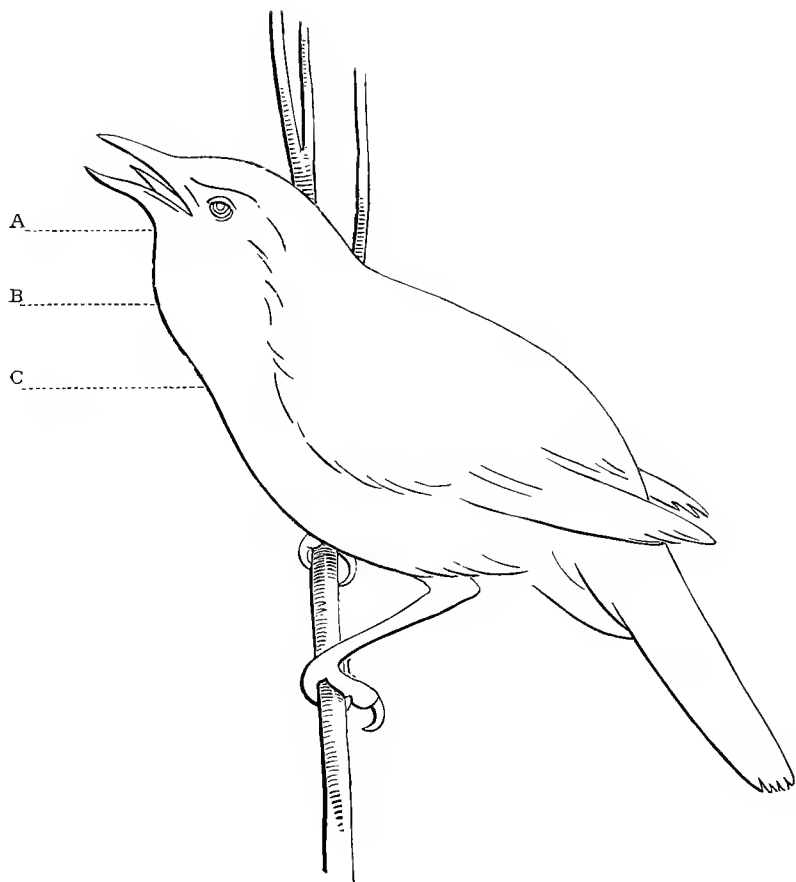
Cornell University Library
MT 821.L96 1895

The philosophy of voice :showing the rig



3 1924 021 787 068

mus



A—Point of resistance.
B—Compressed air.
C—Point of voice.

THE
PHILOSOPHY OF VOICE:

SHOWING

*THE RIGHT AND WRONG ACTION OF VOICE
IN SPEECH AND SONG.*

WITH LAWS FOR SELF-CULTURE.

BY

CHARLES LUNN.

"New-fangled theories have not as yet improved upon, and are not likely to improve upon, good old-fashioned practice."—*The Times*.

"Get your voice disciplined and clear, and think only of accuracy, never of effect or expression . . . most likely there are very few feelings in you at present needing any particular expression; and the one thing you have to do is to make a clear-voiced little instrument of yourself, which other people can entirely depend upon for the note wanted."

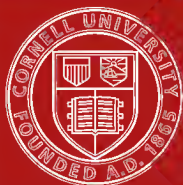
RUSKIN.

EIGHTH EDITION, ENLARGED.



LONDON:
BAILLIÈRE, TINDALL AND COX,
20 & 21, KING WILLIAM STREET, STRAND.
W. REEVES, 185, FLEET STREET.
1895.

[All rights reserved.]



Cornell University Library

The original of this book is in
the Cornell University Library.

There are no known copyright restrictions in
the United States on the use of the text.

To

THE MEMBERS OF THE MEDICAL PROFESSION,
A PROFESSION IN WHICH SELF-ABNEGATION AND SCIENTIFIC
RESEARCH HAVE EVER REIGNED SUPREME,
THIS ESSAY,
WITH EVERY FEELING OF ADMIRATION, IS RESPECTFULLY
DEDICATED.

PREFACE TO EIGHTH EDITION.

THE exceptional success of this work has induced me to revise it, and add much entirely new matter, unattainable from other sources, to the educational part, in order that it may be an authoritative textbook in the hands of both master and pupil, and of clear direction to those who cannot obtain private tuition. This is the only work on voice based upon the relationship of mind to body, and results founded on this relationship are reached in far less time and with greater certitude than by the usual unphilosophical and tentative methods now in vogue. At the time these papers were written no attempt had been made to explain the difference of internal form between the voice organs when producing musical and when producing unmusical tones. Many works have since appeared, but to an expert they bear internal evidence of coming from the hands of those who have never learned to sing. I have given two sketches, one showing the voice organs as warped by association with twenty or more years of spoken words, the other showing

the internal form as restored to its normal balance by rightly-directed work.

I have gone for analogy to the song-birds, for these are constant living examples of right voice-production as contrasted with human error.

One of the greatest, if not the greatest, of the few representatives then left of the old school (Signor Cattaneo, Bosio's master) was my trainer. Finding his teaching opposed to most modern views, I felt it my duty to give up a promising public career for the sake, if possible, of rescuing from complete loss the traditions consigned to my care. Here is independent testimony of his school :

Quality.—"Mr. Lunn sang with a sweetness and tone forcibly reminding the hearer of Giuglini."—*Worcester Herald*, 1864.

Compass.—"Mr. Lunn's voice is of wonderful compass (three octaves all but one note) and remarkable power, and he knows well how to use it."—*Birmingham Gazette*, April, 1864.

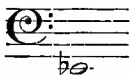
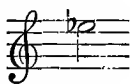
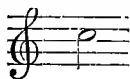
Style.—"The most noticeable point (of Beethoven's 'Engedi') was the tenor singing of Mr. Lunn, who that evening made his début before a Cheltenham audience, and who promises to take a high position in public favour."—*Musical Times*, 1866.

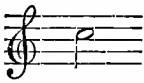
"Everyone who has had the privilege of hearing Mr. Lunn sing must have been struck by the rare union of power and sweetness in his noble voice."—Sir Morell Mackenzie, "Hygiene of Vocal Organs," third edition, p. 98, 1887.

"Within seven or eight years previous to 1891,

when I wrote 'Die Menschliche Stimme,' I many a time had the opportunity and pleasure of listening to Mr. Charles Lunn's, my teacher's and esteemed friend's voice productions, with which, by way of exemplification, he used to intersperse his lessons, given either to me or, in my presence, to others. Although in 1891 he was past fifty years of age, his masterly-trained voice possessed still the full vigour, mellowness and flexibility of that of a youth. As to compass, it is true, it then had lost two notes, as

it reached only to the harmonic C while formerly, according to his own statement, which I have no reason to doubt, it went as high as E \flat yet even so, it presented the very respectable compass of over two octaves and a half, *i.e.*, from the bass E \flat



to the harmonic C  and it served as a fair specimen of 'durability of voice.' Thus Mr. Lunn evidences, in his own person, the excellence of that school of which he is such an able exponent and indefatigable champion."--Erdington, Oct. 6, 1894. (Signed) *P. L. Ignatius Trueg, O.S.B., translator of this work.*

My own impression of myself is that I am exceptionally ill-formed for superior voice, and am a living example of what proper training did with the worst material.

Thus much for art qualifications; as regards

science, the whole principle of the natural physics of voice must have been revealed to me when a boy of fifteen, studying ornithology in its best school—the school of Nature.

The following quotations from foreign papers will show the need of a higher class of teachers :

“Liszt tells us the race of singers has died out ; but it would seem as if the race of singing-masters had gone after them. Continental singers and singing-masters are very much below par, and Petersburg is no exception to the rule.”—St. Petersburg correspondent, *Magazine of Music*, September, 1888.

“Our conservatory is absolutely valueless ; in the classes of song they sing no more. . . . The feebleness of the studies is sufficiently demonstrated.”—*Matin* (leading art paper in Paris).

“What are the means adopted to dam the torrent that menaces to draw everything in song to ruin ? That the art of song is on an inclined plane, and threatened with complete ruin, no one now dares to doubt ! How many young persons are there with throats of gold reduced in shortest time to a most miserable state by the crass ignorance (*l'ignoranza crassa*) of their professors ! The Minister of Art at Rome should convoke all the masters of song of the various conservatoires, and make them pass publicly an examination, theoretical and practical.”—*Il Mondo Artistico*, Milan, September, 1888.

It has been my endeavour to collect proof of my system from other sources, so that the odium of

originality may be removed from me. The eminent singer Clara Novello had the most perfect production and *technique* of any English singer ever heard. She sang at *La Scala* Carnivale and Quaresima, 1854. In a treatise published by her sister, Sabilla (1856) are embodied the principles on which she was trained, and they are the same as those of my master. Richard Bacon, herein quoted, wrote "Vocal Science" in 1824, when singers sang and teachers taught; and Madame Mara (born 1749) said: "People cannot teach what they don't know—my scholars have my singing to imitate, those of other masters seldom anything but the tinkling of the pianoforte" (Dr. Kitchener on Vocal Music, 1821).

I believe I am right in stating this is the only scientific work written by a singer trained on the highest lines of the old forsaken school. Many modern trainers refer to Lamperti as representing that school, but it is not so. His views were unphilosophical and wrong.

"Lamperti, the Italian singing-master who has just died, came into notice as an accompanist. While accompanying he matured his views on singing. Earlier in life he acted as orchestral conductor and organist, but he does not seem to have ever been a singer."—*Musical Herald*, 1892.

The following lines from Pope will give the keynote of the system :

"First follow Nature, and your judgment frame
By her just standard, which is still the same ;
Life, force, and beauty must to all impart
At once the source, and end, and test of art."

The frontispiece is merely outlined as Mr. Ruskin suggested to me, but I fear it realizes his prediction ; however, it serves its purpose, and, I contend, proves my point.

Last year the British Medical Association threw out this piteous appeal, but the heads of musical colleges did not hasten to snatch the gauntlet up : “For some years past it has been matter of common observation that clergymen of all denominations, barristers, singers, etc., are frequently disabled from following their vocation, due to improper use of voice. Inquiry and observation have taught those interested in such matters that a large number of teachers of singing are not themselves acquainted with the best method of using the voice, and are therefore not able to impart it to their pupils. Seeing how much distress is occasioned by the lack of this instruction, the Council of the British Medical Association venture to beg that you will take the matter into your grave consideration.”

When will this be done ?

CHARLES LUNN.

LONDON, *December*, 1894.

THE PHILOSOPHY OF VOICE.



INTRODUCTION.

THE VOICE ORGANS OF BIRDS.

THE superior larynx (A, *frontispiece*) of birds is situated at the base of the tongue, and its function is to rule, measure, or suspend the escaping breath, whether voiced or unvoiced ; it answers to the false cords in man (p. 72). The superior larynx (A) of these perfect voice-producers has solely to do with the natural physics of voice, while the inferior larynx (C), which is pushed down into the chest, has solely the musical part, not the resisting part, of the work. The corresponding part to C in man is the true cords (p. 72). The space (B) between A and C in birds is seen to swell in response to the power of voice. This is owing to varying degrees of compression of the air, and it shows by its bulge the backward push in true voice-production. Its corresponding part in man is the ventricles (p. 72). Dr. Lardner nearly got the truth when he wrote : “The drum itself is the organ by which the intensity of the sound is increased, and is analogous

to the laryngeal ventricles of mammals " ("Animal Physics," vol. ii., p. 623). The sketch given as frontispiece is taken from Gould's drawing of the sedge-warbler; it is a polyglot, so is typical of the species. The greater volume and intensity found in the voice of a bird in comparison with that of a man, taking respective sizes into consideration, is owing to the greater proportional space between the top part of the instrument and the lower part. It is a self-acting instrument, obedient within its limitations to the will.

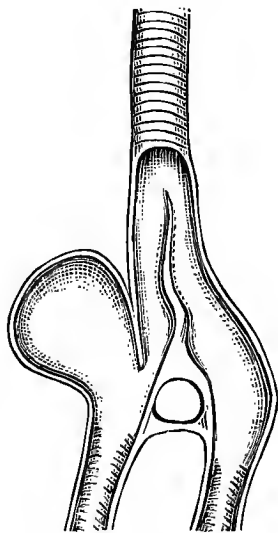
A thrush perched at the top of an ash-tree in my garden begins pouring out its full ecstasy of song at daybreak, and, with slight intervals for refreshment, ends at sunset. This will go on for two months or so, without the slightest appearance of fatigue or the slightest sign of loss of tone in voice.

This is the mode of voice-production that in the following treatise I have endeavoured to induce in human beings, and define its cause.

A singular proof of the use of caverns as resonators multiplying sound is found in those birds whose voices are comparatively fixed, such as the common wild duck. There is no capacity of contraction or expansion as there is in us, for the space is bone, and hen birds have it not.

Yarrell writes: "The column of air on the right side of the bird, and in the representation, goes direct from the right lobe of the lungs to the tracheal tube; but the column of air on the left side, on passing through the bronchial tube, is

opposed by the descending edge, and, being divided by it, a portion is sent in circles round the inner edge of the cavity before it becomes united with the air from the other lobe in the tube common to both. A compound tone of voice is thus produced, by which wild-fowl shooters can distinguish males from females of the same species in the darkest night.”—“British Birds,” vol. iii., p. 180, 1843.



SECTION OF WILD DUCK'S TRACHEA.

PART I.

“All beings contain but three elements, namely, substance, force, and law : substance, which is their centre of being ; force, which is their action ; law, which is the measure of their action.”—PÈRE LACORDAIRE.

ONENESS of being is a necessary property of a living body, and in order for the will to operate there is required an external unity of the parts, of the members one with another, and of all with their common head. If their external unity is interrupted, the intrinsic principle of oneness is gone, and the power of self-manifestation contracted or destroyed. In learning to play upon instruments external to man, the eye considerably assists the mind ; but in learning to play upon our own instrument we are learning to act through an invisible thing that is part of ourselves ; consequently, the laws of obtaining control are not the same as acquiring mastery over an instrument detached and inanimate.

In the outset it is important that the author inform the reader clearly of the first principles on which he rests his school. We are mind and body. We share in the laws of matter in so far as we are material ; but our soul, or intellect, or

mind—whatever the reader likes to call it—is the life, and this life informs and rules our bodies within the limits of their capacities; knowledge extends in degree a capacity, ignorance contracts it. St. Thomas Aquinas teaches that the body does not possess the soul, but that the body is possessed by it; that the soul is complete and entire all over the body, and in each part of it, and capable of manifesting itself in any given locality of its possessions by action. Huxley considers us as “conscious automata”; but this involves a denial of Will. Bain calls man “a double-faced unity.” John Stuart Mill said “thought and matter are not merely different, but are the opposite poles of existence, and the opposite of material existence is *immaterial* existence”; he therefore considers man as a united diversity. Whichever way we look at it, we believe we have a Memory to recall the past, a Will to rule the present, and an Understanding to guide the future. Will is a weight which, put on one side a balanced scale, makes the other “kick the beam.” Carpenter defines it as “a determinate effort to carry out a purpose previously conceived”; and Rev. M. Maher, S.J., says: “Volitions cannot proceed from nothing; they must have a source from which they flow” (“Psychology,” chap. xx., p. 444). The sequence of the Understanding is this: we first perceive a thing; then it sinks into our minds, and we apprehend it; then we bring in all the arguments in favour of it, and we comprehend it; then, lastly, all the arguments that can be brought

against it, and if it bear this test we are convinced of it. From conviction comes judgment, from perception mere opinion.

Vital Force is a store of life; we call it "freshness" in a horse, "friskiness" in a kitten, and, sometimes, "mischief" in a boy. In the young it manifests more its excess, and its attempt at exhaustion, because it is shut up in a smaller area—that is, enclosed in a smaller space.

In our life we have, primarily, automatic actions, like the beating of the heart; then we have, secondarily, automatic actions which have to be learned by Will locating vital force, but when learned, the supply of vital force keeps up the action until the store is spent, and under such condition the Will is released to operate independently elsewhere. The location of vital force is not the consumption of force by Will, but the application of a reserve of life; and its application goes on, when located, until the store is exhausted. Then, and not till then, the Will draws on the surplus balance, and in extreme circumstances has the power to create a deficit. The recuperative power of Nature restores by rest the lost equilibrium.

Then there is the location of attention. This is purely spiritual. A watchmaker may have a dozen watches before him, the mechanical tick of which is identical in all; but by paying *attention* to the one he wants to observe he intensifies his perception of the one, and lessens, to himself, the force of the tick of the others. The bystander

does not realize this, because he has no wish. There the *Will* rules, not the *Body*. The same intensification of a receptive faculty can be brought about by drugs, but the *Will* is then incapable of selection. In this latter case the *Body* rules, and not the *Will*—*Matter versus Spirit, re Spirit versus Matter*.

But we have another point of consideration, which may be called the elastic bridge; that is, how much, during life, *Spirit* will yield to *Matter* and *Matter* yield to *Spirit*. Let me put the relationship of mind to body thus: As the extrinsic principle of the unity of a body is the union and communion, co-ordination and subordination, of its head and members, so the intrinsic principle of its unity is the abiding presence within it of our spiritual life-giving soul.

Singers and voice-trainers have never considered the balance of forces. Take physical forces. If a man go up in a balloon, as he ascends so the air-pressure on his skin decreases, the physical action of the heart being the same. If he go up very high the blood is forced out of his ears, nose, etc., and he may go up so high that it even oozes out of the pores of his skin. This is the compulsory result of the decreased physical resistance given to a physical force acting in opposition to it—the weaker yields, the stronger rules.

But now take the cross-action between spiritual and physical forces—for we are mind as well as body. Labour will make us perspire; so will fear, and anger, or anxiety. By imagining the intensity

of anguish that so increased the force of circulation, the resistance being the same, that sweat like blood exuded through the skin, we get a faint idea of the "Agony in the Garden."

The chief characteristics of the old Italian school were ease, power, volume, and endurance: four characteristics shown now as ever by our song-birds; and we, like them, have to obtain effortless, full, sustained, and beautiful tone if we wish to sing well. In order to do this we must have our bodies right, and our minds must perceive Where to Will, How to Will, What to Will, and—what is most important—What *not* to Will. A pianist cannot strengthen his third finger by using the fourth; and in like manner a student of song cannot strengthen his voice by falsely placing or falsely directing his Will. To one student who fails through want of ability, thousands fail through want of clearness of direction on the part of the trainer and imperfect perception on their own. A student must always keep in mind what he wishes to attain; it is not *any* sound that will do, but only *beautiful* sound, and beautiful sound is the result of clearness, smoothness, volume, and intensity.

The old school was celebrated for these conditions, but specially for volume,* a property modern singers lack.

* The *Daily Telegraph*, writing on Alboni's appearance at Rossini's funeral, said: "The splendour of her massive voice was a revelation to many. The greatest voice that has been heard in our generation has lost nothing of its pristine luscious sweetness. The style, moreover, of the vocalist belongs to a former school, the secret of which seems to have been lost."

To obtain a knowledge of vocal emission, the conclusions arising from different aspects of observance must be made to agree. Professor Huxley says: "Before you can possibly be safe in dealing with Nature, you must get two or three kinds of cross-proofs, so as to make sure not only that your hypothesis fits that particular set of facts, but that it is not contradicted by some other set of facts which is just as clear and certain." As a scientific basis, we have the observations of the anatomist, who has pointed out, irrespective of results, what the instrument is, and what he has gained from the instrument acting by itself, as he imagines, in accordance with natural laws. Then we have a number of theories, more or less tenable, deduced from the complex results obtained from the instrument acting in connection with other influencing causes. Of these theories, some have been drawn from the instrument acting in strict accordance with Nature; others, as in the case of all laryngoscopic observation, from the instrument more or less distorted; and many others are pure inventions of the imagination.

We have the theories of unscientific vocalists; we have the theories of musicians who reason by analogy; and we have the theories of scientific men who cannot sing or produce aright their own voices. It is my privilege to explain away their differences, correct their errors, and raise their standard.

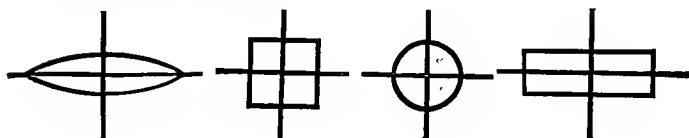
It is singular that in all experiments, both on the living and on the dead, the most *important*

point seems to have been overlooked, and that is, that there is *beautiful* as well as *ugly* vocal tone; that beautiful sound is the natural result of true adjustment of an instrument over which the orator or singer has absolute unfelt control, while ugly sound is but a crippled result of solely a partial control. There have never been any attempts accurately to define wherein the difference lies between a *true* and *false* use of the human instrument of sound, nor has anyone tried to show the induction of error, and trace its corrective study.

With a view to secure this beauty of tone essential to the art of singing, the voice-trainer has to reinstate a control proper to Nature, which control has become *weakened* by the association of articulative speech with vocal utterance, causing (1) a perpendicular and (2) a horizontal weakness—purely a physical disadjustment, in effect causing the sound to be feeble, dead, and only partially responsive to the will. We must correct the horizontal weakness by a right adjustment of the horizontal force, and the perpendicular weakness by a right application of the perpendicular force.

Sound is air in motion obstructed, or air stationary put into motion by an elastic substance. In a string instrument the solid is the active principle, acting on a stagnant fluid; in a wind instrument the fluid is the active principle, acting on a stagnant solid. Noise is either a single disturbance of air or conflicting disturbances; pleasurable sound is the result of successive and equal disturbances; so that a noise arising from

a single disturbance may only want *continuity* to transform it from offensive into agreeable sound. Where sound results from air resisted forcing itself through a fissure, that sound cannot be musical unless the fissure be symmetrical—that is, unless it be divisible by two straight lines at right angles into four equal parts.



Musical sound, as before said, is compounded of clearness, smoothness, volume, and intensity. When air passes through a fixed fissure, clearness results from the smallness of the fissure, smoothness from its form, intensity from the force of blast resisted, and volume from air imprisoned in one or more caverns. In a vibratory material, the clearness, the basis of the quality, results from the intrinsic nature of the thing; the smoothness from unimpeded swing; the loudness is owing to the width or amplitude of swing; and the volume results from reinforcement from attached parts. A vibratory tuning-fork placed on a table has its sound so strengthened thereby that a child, judging by sense of hearing alone, would ascribe the sound to the table, just as a child would suppose a rainbow to be an arch of colour supported by its ends resting on the ground. Vibratory matter placed above air imprisoned in the chest has its sound so strengthened

that many ascribe the sound to the chest itself—hence the term “chest” register.

The term “head” is the result of the same superficial observation, and to make the physiological terms complete, the centre of the voice should have been termed “mouth” register. Of late these misleading terms have been discarded by some for others of a worse kind: “Thick” production means an unmusical voice impeded by phlegm (*voce rauca*), while “thin” voice means a tinny tone lacking fulness, and valueless from an art point of view. Thus much for generalities, now for particulars.

All that we do is dependent upon resistance; there is a resistance acquired, and there is a resistance incidental to our being; there is a resistance permanent, and another temporal. In all our relationships with the world without, our control is an acquired knowledge of forces acting in opposition; this knowledge results from numerous past experiences, and has grown with our growth. In our own construction there are forces placed in opposition, so that, when in a state of repose, muscles are not inert and flaccid, but balance each other; this condition is what is termed “tonicity.”* With the organ of voice there is an exactly similar condition, which may be termed “the tonicity of voice,” and it is the purpose of this work to explain this balance and to show its disturbance by spoken

* If an arm be dislocated, the muscles which pull inwards are released from the opposing tension, and considerable and somewhat rude force is required to draw out the arm sufficiently to replace it in its socket.

words. Under this condition of balance breath and cords act equally, the pressure and resistance being equipoised; but there is a small yielding surface presented by the vocal cords being elastic, and we have to consider our two forces, (1) air in motion (breath), and (2) the elastic obstruction (cords).

(1) The perpendicular force; that is, the pressure acting upwards in man. The following plan of our breath-power will illustrate the first of these two forces.

Immovable.		Residual Air.	120 Cubic inches.	Immovable.	
Intraction.	Involuntary	Supplementary Air	130 Cubic inches.	Voluntary	Propulsion
		Ordinary Inspi- ration.	26 Cubic inches.	Involuntary	
		Ordinary Expi- ration.			
	Voluntary	Complementary Air	100 Cubic inches.		

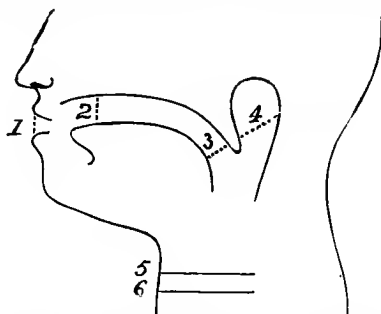
The *residual* air is that which we never can get rid of; then there is the *supplementary* air, which in ordinary breathing we do not expel, but which we can squeeze out if we will to do so; after these there is the small quantity of air called *breath* added to the two former quantities, which, both in its exit and entrance, is independent of the will; lastly, we have what, by willing, we can add, and forcibly draw in, over and above the preceding, and this is the *complementary* air. On the one side, what is drawn in by Body can be expelled by Will;

on the other, what is expelled by Will will be drawn in by Body.

As there is no occasion for a public speaker or singer to do the work himself, when the involuntary contractile muscular force will do it for him, it may be laid down as a Universal Law that Complete Inflation is the first condition for true use of the organ of sound.

(2) The second or horizontal force is twofold: (a) from right and left of the throat, (b) from front to back of it. The former or perpendicular force depends for its accuracy on this latter or horizontal force. This is the principle by which the breath may be imprisoned; this necessitates a short investigation of speech. It will be seen that Nature's law is one, and a most simple one; and that however complicated language may appear, it is reducible to a few fundamental principles.

The first place where breath can be resisted is at 1. This resistance results from a closure of the lips.



By ceasing to will to hold, an explosion of the air takes place, in result the letter *p*. By holding with

the tongue at 2, the air is imprisoned ; ceasing to will to hold, an explosion takes place called *t*. In ordinary expiration, the breath escapes either through the greater passage terminating at the mouth, the column of air in motion striking on the soft palate and elevating it, or it escapes through at 4, and thus acts by the nose. By holding breath at 3 and 4 both passages are blocked, the uvula acting directly in this, occupying the indentation at the base of the tongue, and thereby aiding the resistance ; by ceasing to will to hold, an explosion takes place called *k*. These consonants, *p*, *t* and *k*, may be termed simple complete obstructives—one a labial, one an arco-palatal, and one a faucial obstructive. The principle in each is one, an act of the will acting in different localities, and causing, owing to the nature of the obstructing force, one explosion of air ; in effect, noise. The difference in result is not owing to difference of principle, but difference of locality in the application of the principle. These consonants can be further increased in power by compressing the breath before uttering them. By going lower down still, to 5 and 6, we come to vocal utterance as contrasted with whispered articulation—that is, we find the same power of obstruction, but which, if rightly released, causes a continuous vibration ; in effect, true musical sound. The action of this part we have to settle.

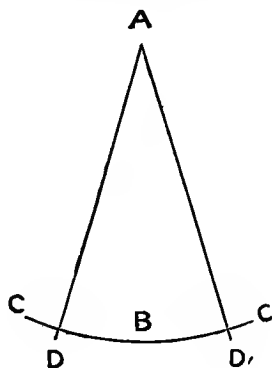
It is better to illustrate by abstraction, as physiological sketches are to the living subject useless for teaching purposes, and, indeed, are confusing rather

than aiding;* so here is given an abstraction of the horizontal force supplied at the lips of the organ of voice. A D represents the outer line of one vocal cord, A D' the outer line of the other vocal cord, and these move together towards the point B.

Let A D, A D', be two straight lines revolving on the axis A, and describing the segment of the circle C. Let the enclosed triangle represent the space through which the air in breathing passes. If we suppose an equally diffused force propelling a fluid through the fissure, the fluid would escape the most rapidly where the two straight lines are at their greatest separation; this escape would be unequal along the whole length of the fissure, increasing in proportion to the increased size. This inequality of escape would be less or greater according as D D' are attracted to the point B or repelled from it. Now, it is clear that a fissure having two sides greater than a third cannot be divided into the required four equal parts unless a point be made at B corresponding to the fixed point at A. If this be done, the points A B being equal, the lines A D, A D', would assume a parallel position. Supposing these lines to represent the boundaries of an elastic substance, they would, under ærial pressure,

* Writing of the "Relationship to Art of the Science of Organic Form," Mr. Ruskin says: "Man is to take every sort of view except one—the butcher's view. He is *never* to think of them (*i.e.*, organic forms) as bones and meat." And again: "No man who had studied the skull as carefully as Dürer did, ever could engrave a face beautifully, for the perception of the bones continually thrusts itself upon him in wrong places, and in trying to conquer or modify it, he distorts the flesh." The same objection applies to sketches of the vocal parts.

alternate between parallel lines and ovals, thereby making the escape of the fluid through the fissure relative and equal, *i.e.*, beautiful as a sensation



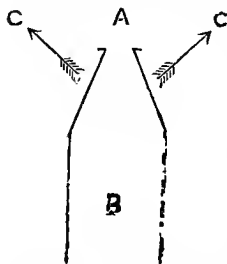
called sound. Dr. Marcet thus clearly expresses the action: "When air is blown into the windpipe, it must force its way through the vocal cords, and by so doing cause them to bulge outwards; but the air now finding a freer exit, and the pressure being relieved, the cords, from their elasticity, will immediately resume their former position. At the same instant the blast, meeting afresh with resistance, will again move the parts aside, and by that repeated action the current of air will be divided into a number of equal sections, reaching the ear in a succession of waves, and thereby producing a vibration perceived as a sound."* Such are the conditions for true musical sound by the voice; but there are two forces at work for evil to prevent right action—one derived from the association

* "Clinical Notes on Diseases of the Larynx."

which has grown up between the nerve-currents ruling the different positions of obstruction; the other, owing to the use of vocal utterance as a secondary thing upon which articulation has been superposed, and the question is, How to get, in the living subject, this point at B?

Having considered the action horizontally, we next consider it perpendicularly.

If a stream of air (expiration) travelling up a pipe in the direction of B to A comes in contact with a contraction of the pipe, narrowing in the direction towards the fissure at A, the pressure below will distribute force in the outward directions C C—upward and outward pressure, a principle acting *from* the mediant line. If the con-



traction is held by will-force, then we have a physical law in conflict with the mind; this conflict, this struggle, is the main cause in voice of our modern *vibrato*, for the sketch is only an abstraction of the lower part of the vocal organs. Either the voice yields to the upper pressure and becomes rapidly enfeebled, or there is war.

The space above the false cords and the space leading from the windpipe to the true cords are wedge-shaped, each inverted to the other. When the true cords are approximated their upper surfaces present a broad flattened plane falling away obliquely downwards and outwards, thereby leaving an angle of considerable size, which forms the

margin of each vocal cord. The same obliquity is observed above the false cords, while their lower margins are defined by the ventricles, well-marked pouches which extend upwards behind them about half an inch. Now, it is to be borne in mind that by closure of the entire instrument complete stoppage is effected, not only of inspiration, but also of expiration, the most powerful efforts at either being rendered quite ineffectual. This is in a sense due to the action of those intrinsic muscles of the larynx which close the cords ; but the strength of these comparatively minute structures is in itself inadequate to resist the enormous power which the air can exert upon the true cords from below.* When in experiments upon the dead or detached larynx artificial expiration is produced by forcing air upwards through the larynx, all attempts to stop the current of air by bringing the true cords into contact are futile. Owing to the form of approach, the air wedges itself between the vocal cords and produces in its escape "a sound which more or less resembles the voice." In inverting the current of air perfect resistance is obtained by solely approximating the true cords ; the air, catching on their flat edges, makes them act just as the valve on a pair of bellows acts : the greater

* Dr. Hutchinson gives as the result of experiments upon the dead subject 580 lb. as the total pressure over the surface of the chest, reckoning an area of 206 cubic inches, and adds that, as during life much more air could be used, "there can be little doubt (judging from the rapid rate in which the elastic force increases when the distension is approaching its limit) that the muscular power to overcome this, towards the close of a very deep inspiration, could not have been less than 1,000 lb.

the force downwards, the tighter is held the obstruction. But on bringing together the *false* cords the closure of the parts is found to be complete; the simple approach of the free edges of the false cords proves sufficient to obstruct entirely the full force of air acting upwards from below. This arises from the air in the *ventricles* creating an influence upwards and forwards. The conclusion to be derived is obvious: There is within the larynx, that is, the whole instrument, a double valve, capable of controlling both the exit and entrance of air; so that we see the plan found so commonly throughout the body in such strictures, as in the course of the veins, holds also good in this.

On placing the finger on the point of the Adam's apple, holding breath, and compressing the air by putting the expiratory muscles into increased activity, the larynx is felt to rise; this results from the air acting in the chambers and on the wedged approach to them, and together thereby forcibly carrying up the larynx. The greater the pressure the more the chambers become inflated, and the greater the inflation the tighter the closure, and consequently the higher the larynx. By feeling sideways with the finger and thumb above the thyroid, and compressing air, the expansion of the ventricles will be most apparent. A successive use of this expansion during singing accounts for the great breadth of throat which all true tonalists attain; for, by a proper use of the organ of voice, the two flat plates of the thyroid become forced out, and a much less acute angle of approach to the

front is obtained. At high elevation the larynx is mechanically shut, and the Will has to open it, but when in a lower position it is mechanically open, and the Will has to hold it closed.



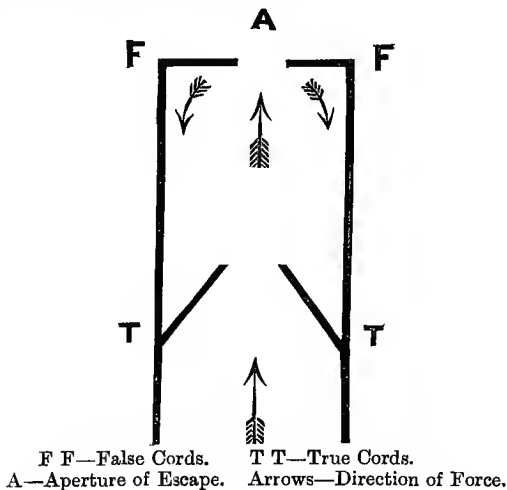
Here is an extension of the principle shown p. 30. If a stream of air travelling up a pipe in the direction of B to A meet with obstruction by the two promontories below C approaching, upward pressure from B to A fills D and D, which become inflated, and if elastic expand, and the air within becomes compressed as the pressure from below B is increased—similar to a man shutting his nose and mouth and gradually pressing from his chest. He cannot help himself; his cheeks are sure to expand, and the tension of the nerves which the air presses upon gives greater control. The caverns D D being filled with compressed air and yielding to the uttermost limits of their elasticity, bulge upwards, and the direction of the caverns being upward—being in the direction of the stream—the

pressure exerted upwards through the walls is in the direction of the mediant line X, thereby contracting the fissure at C. This is exactly the condition of the instrument for artistic voice. If we construct an artificial larynx, with ventricles of an elastic substance capable of yielding a little to pressed air within them, and then with compressed air below loose a little of the parts analogous to the *false* cords, so that the fissure between them shall be so small that a compressed condition of the air can be sustained, we get the whole principle of beautiful voice so far as the material side is concerned.

Here is the argument put in other words :

I. When a note is being blown from an elastic flexible reed, the force put into the elasticity of the reed must be perfectly uniform in order to secure regularity of vibration in the reed ; or, in other words, steadiness of note. This uniformity of air supply in voice cannot come from the true cords, for they are repulsed by the air supply and so cannot repulse it, therefore uniformity of air supply depends upon F F restraining air in its exit. For example, the ordinary canal locks will show the direction of resisting force supplied against the weight of water. Then, it is asked, Can a man with *no resisting parts* present a small supply of air with as much force as a large supply of air ? Evidently he cannot, for it is impossible to force a *small* stream of fluid through a *large* tube without great force. And this was the *physical* flaw in the training of the Neapolitan teacher Scafati.

Being so, an unsteadiness of note at least towards the end must be the consequence, to say nothing of the tremendous muscular (diaphragmatic) exertion. But the object of an artist is to be able to sing in power *inversely* to his quantity of air. On the other hand, if the false cords present only a small fissure for air to pass through, there is no difficulty in passing air up with steady force; for even when the supply is small, it is merely equivalent to pressing a small stream of fluid through a small pipe. In this state steadiness of note and little muscular effort will be noted.



II. Moreover, the *ease* and *steadiness* of vibration of true cords is much increased by the false cords in action, for as only a small stream passes out at A, and this at great pressure, there is a backward force (back eddy) down either side.

This backward force is most apparent just when the true cords have opened, allowing a fresh addition to the stream of air through A; consequently it is just in time to aid the true cords to recover their former position of rest. The result is that with increase of blast the vibrations become more ample, or, in other words, the note is louder; but the backward and downward pressure is at the same time increased, and the true cords are kept in vibration just as steadily as before. Hence the steadiness of *loud* and *soft* notes in the old Italian school, and the explanation of the modern vicious *vibrato* school (compulsory wobble), which is in conflict with these principles.

The ventricles are not introduced in the above diagram because they do not check the back eddy and are not part of this argument; but the introduction of the form of their walls and their elastic expansion would considerably *augment* it. Wyllie in his "Physiology of the Larynx," (pp. 8-11), and Czermack support in the most clear style the utility of the false cords and ventricles.

III. The false cords and ventricles being present (see any work on physiology), they are there to perform some duty. (1) Ventricles can be there for nothing else than *inflation*, consequently they are there as *resonators*. (2) The false cords are there either for *resisting* or for *vibrating*; but they cannot be for vibrating, for they would then have to vibrate synchronously, or, in other words, concurrently or simultaneously, with the true cords in every note. Against this we have: (a) how can two

pairs of cords in the same tube, inverted to one another in their vibratory motion, be put in synchronous vibration by the *same* current of air? The thing is impossible. It will open one pair and shut the other. (b) Wyllie could not make one pair vibrate without the other pair closing (*cf.* "Physiology of the Larynx," pp. 10, 11)—that is, when the true cords opened, the false cords shut, and *vice versa*.

IV. The following extract from Helmholtz's "Sensations of Tone" (p. 152) strongly supports the use of false cords and ventricles and the attack:

"A brass tongue, toned to B \flat , was applied to one of my larger *spherical* resonators. After considerably increasing the pressure of wind in the bellows, the tongue spoke somewhat flatter than usual, but with an extraordinarily full, beautiful, soft tone, from which almost all upper partials were absent. *Very little* wind was used, but it was under *high pressure*. . . . The theory of the vibrations of air in the sphere shows that the greatest pressure of air must occur in the sphere at the moment the tongue opened; hence the necessity of strong pressure in the bellows to overcome the increased pressure in the sphere, and yet *not much wind really passed*."

Put the argument another way. Let A B represent a straight, steady, equal tone at full power: A ——— B. In *any* system a loud note ought to be able to be held perfectly steady till nearly the end of the breath. This requires *uniform force of*

air blast, whether the volume of air be great (as in the beginning) or small (as at the end). The system which obtains this with *least* muscular effort will be the true one. That system is the system of false cords and ventricles in action, for force equals volume (mass) multiplied by acceleration.

First, let us consider when false cords and ventricles are *absent* (inactive). We require uniform force. Our volume is decreasing, therefore acceleration must be constantly increased by muscular effort, so that when volume is very small the effort will be immense, just as pushing a small stream through a big pipe.

Secondly, let us consider when false cords and ventricles are *present* (active). Our way of exit for the air is so small that the effect is practically the same as having a *constant volume*, consequently the acceleration need hardly be increased, and the effort at the end of the note is scarcely greater than at the beginning. The end of one note is equivalent in action to the forcing of a *small stream* of liquid through a *small pipe*.

Goodeve, in his "Principles of Mechanics" (ch. ix.), shows that by opposing fluid pressure we obtain two different powers counter-balancing each other, so that an ordinary plunger pump can be made double instead of single acting, and by opposing pressures we obtain a balanced valve which can be opened by a small force. This is the natural law to which a student should be led.

The principle of a fluid ruled by a solid is shown in the following experiment, but in artistic voice

the voiced air is guided by the inner walls : “ Put a lighted candle behind a bottle, pickle-jar, or any other object having a polished surface, then station yourself at about twelve inches from the object, so that it hides the flame of the candle from you, and blow with your breath. The candle will be very easily extinguished, in consequence of the currents of air that you have created around the object meeting near the flame. With a board or a sheet of cardboard of the width of the bottle extinction would be impossible ” (*Le Chercheur*).

Having seen the action of the instrument, we have to see its connection with attainable results—results, be it observed, both good and bad. These are partly voluntary, partly mechanical. At the first cry of life the whole principle of true musical sound by the voice is displayed ; there is clearness, volume (allowing for the size of the infant), and intensity, and only continuity is wanting to transform such cry into musical sound. It is admitted that life cannot ensue without this cry, or an approximation to it, so we will trace its origin. This cry is essentially mechanical, and is brought about by reflex action of the spinal cord ;* so it may safely be proclaimed that while people may be born cripples in other parts, they cannot in the parts producing music, for cry they must or never live ; hence it follows that all false use, all bad sound, is *induced*, and can, therefore, be *removed*, unless the parts become diseased in after-years. On the one

* The reflex action is a rebound of the nervous system, independent of the will.

hand, while reflex action causes the first inhalation of independent life, on the other, owing to the difference between the temperature of the blood and that of the air introduced, additional reflex force is generated, the air is expanded by heat, and a complete closure of the false and true cords results; that is the mechanical process which goes on before the dawn of consciousness. This resistance against the rebound of the respiratory muscles drives the inhaled air into the most remote ramifications of the lungs, and thus furnishes the residual air which, as we know, is immovable, and remains even after death, and could not get there save by such action as the above. If the opposing power were not perfect, we should have no safe guide to prove the existence of an independent life.

Here, then, we find in the release of this obstruction—brought about automatically by sole approximation—the same application of the before-mentioned principle, air compressed and released. The sound produced by the infant cry would answer to Dr. Wyllie's station note; but owing to smallness of size, it would be, in the infant, considerably higher in pitch than the station note obtainable from the adult. Then we add another simple explosive at 5 and 6, which explosive, instead of being confined to one impulsive disturbance of the air, has, owing to the nature of the parts which generate it, a power of being sustained, and this sound, resulting from an equal admixture of breath and cords, is the open vowel *a* (p. 26).

The vowel sounds of speech are five :

Italian—*i, e, a, o, u*. The corresponding sound in English would be *e* ; and for the second, *eh*, or the first part of the diphthongal sound given to our first vowel *a* ; for the third, the broad *a*, as in *father* ; for the fourth, the first part of our diphthongal *o* ; and for the fifth, *oo*, or the latter part of our *u*.

Professor Max Müller attributes the difference in vowels to the different form of the cavity above the organ of voice, and this, so far as whispered articulation is concerned, is true ; but with full speech other influence is brought to bear—namely, a difference in the proportions of forces. To produce *e* (English) the larynx is higher, and to produce *u* the larynx is lower than it is for the central sound *ah*, so that, assuming equal pitch for each sound, we find for *e* more tension of vocal cords, and less consumption of blast, while for *u* we find less tension, and consequently greater consumption of air. The intermediate vowel sounds of course lean one way or the other. But all these vowel sounds are sometimes automatic, and are uttered under reflex action from a moan to a shriek, according as the direct nerve-current influences the immediate instrument of sound or the entire body—that is, according as the feeling experienced be acute or massive ; so that we get language as the natural outgrowth of our construction. In this instrument of voice pitch can be made in two independent ways : by tension of cords or by increase of blast. This is readily proved : on pressing backwards at the point

of the Adam's apple, and uttering a sound, when the finger is released the sound elevates itself ; on sustaining a sound, and giving a blow on the chest, the sound momentarily rises in height. The vowel sounds of voice may be best represented thus :

Equal combination.

	A	
E		O
I		U
Cords.		Breath.

The two powers, tension and pressure, must unite, but *may* unite in varying proportions.

Professor Helmholtz evidently based his "vowel theory," not on *trained* voices, but on ill-produced ones, just as we might deduce acoustic laws from a cracked fiddle or an ill-tuned organ. The tone of voice is primarily intrinsic, as the clang-tint of gold or of silver irrespective of form or superscription ; and the united effort of master and pupil is to get accuracy of vowel tone with *least* change in larynx, in result nearest equal sensation of tone.

In training the deaf and dumb the contrary is the rule—the greatest physical changes are made to produce the difference between one sound and another, in order that the student may perceive by sight the cause of the result in sound. Many singing-masters commit this error in training, getting greatest change.

Equal combination.

	A	
E		O
I		U

That is, there is greatest contrast of tone between

the extreme vowels ; there is less *volume* than need be in *I*, and less tone and more wind than need be in *U*. As regards these remote vowels, it may be said : If they are in our speech we do not want to learn them ; if they are not in our speech, our language is imperfect. What is wanted underlying *all* vowels is *oneness* of tone, but by studying on different vowels we retain and develop the tonal contrast which should be eliminated.

Man is not protected from error like the lower animals ; while developing in one direction, he may be injuring himself in another. Just as small type will produce shortness of sight, so the association of consonants in speech produces a loss of vocal control. The object of speech is to say what we have to say in the shortest space of time, and speech sacrifices everything to attain this one end ; but the object of song is to say that which we have to say in the deepest and intensest mode ; hence this latter appeals to man through all his powers of reception. Speech owes its strength to profundity, song to amalgamated forces. We will briefly trace the fall of vocal tone. Weakening at 1 (p. 26), we obtain *b* ; at 2, *d* ; at 3, *g hard*. These, losing in power, require a substitute of sound upon which they can be superposed ; hence partial approximation at 6 is introduced, and we thus get a series of compound obstructives, like two locks in a canal, and the consequent associated acts of will, producing in time habits of action.*

* I believe it was on the vocal tone in B, D, and G that Strakosch taught Patti the location of thought and the economy of air. If

This principle of substituting associated force for local weakness in the voice-organs is still further developed. Changing the channel of exit and closing at 1, we get *m*, closing at 2, *n*, and with further development we get the close aspirates, *f* at 1, *s* at 2, and the compound aspirates *v* and *z*, until we ultimately arrive at the height of un-musicality, expiratory air forced out by voluntary pressure through the quite open tube, giving the letter *h*, the letter *h* being the exact polar contrary to true musical sound, for it is made by the uttermost opening the opposing forces A D, A D' (p. 29). Physically, in speech, man blocks, crushes, splits, and slides columns of air in motion. Now, as the first principle of language is rapidity, so it follows that to gain this, continuity of sound must be proportionately sacrificed; hence it follows that to extend a vocabulary according to the ever-increasing wants of civilization, consonants are called into greater use, and vowel sounds are dropped. Coleridge, in his "Table Talk," supposes a language made entirely of consonants; and now we find such in daily use in our shorthand system, which is solely an extension of the principle rapidity. Let the reader test the past statements by whispering *p b* or *t d*; it will be noted that *p* and *t* are respectively *b* and *d*, only made stronger by applying increased energy or stronger nerve-current at the points of resistance.

this be so, he anticipated a physical discovery by imprisoning air in order to locate the will on the vocal organs.

Next note the difference out loud: *p* is an explosive carried by the force of a vowel succeeding it; *b* is a suppressed vocal tone exploding into a full vowel. But the aspirate *h* is air escaping as water runs through a sieve.

So that amongst the people of every nation we find two forces at work, one of development, one of restitution. The scholar is ever seeking for new symbols to express things or states of consciousness, while the man of small intelligence or few demands makes his words subservient to his bodily convenience; the one adds and sharpens the consonants, the other slurs or drops them, and works on vowel tones; and this is the reason why the voices of the lower orders are generally more sonorous than those of the upper. The more developed a nation, the fewer inhabitants proportionately use their language aright; for the language shows the intellect of a nation at its best, and the higher a standard the greater the culture required to attain it, and the fewer persons with innate capacities capable of grasping it. Thus, accepting sounds as symbols, we find a natural power differently applied, which, while serving its purpose to the full, does not secure man in its use from substantial error in other directions. This shows the prospective benevolence of an Almighty Power forming with increased civilization new spheres of action in which man may find true work. And in further corroboration that the downfall of tone is owing to the daily action of articulate speech, it may be noted that children's

voices are powerful, clear, musical, and sympathetic; they have not had sufficient use to cause the loss of relationship between natural pressure and resistance in the instrument itself.

If a man be obliged to make himself heard, he will obtain power in some sort of way if he can; but the chances are, if obtained, it will be obtained in the wrong way. It is curious to trace how this is brought about. For instance, the sharp thin sound of the "Cockney" dialect is the inevitable result of a forced power generated falsely. The constant noise of traffic compels in speech a sharp, clear sound, and, given the induced debility of the attracting muscles, this is brought about by lessening the size of the passage above the organ of voice, thereby decreasing the volume, but by constriction gaining in power. And it may be noted that a sort of opposite to this is shown in the dialect of the "Black Country." This dialect opens the sound, hence the credit of the Birmingham Choir for "volume."

There is a class of men who seem especially to suffer from their attempts to create power falsely, so much so that the result upon themselves has given the name of "the clergyman's sore-throat" to the disease. Of course, all those who of necessity use the voice much thereby cause a greater flow of blood to the parts, and the parts being exposed, are liable to be affected by sudden change of temperature. But this fact itself will not account for the disease, for it has been observed that those who can produce true tone do not suffer therefrom;

the tone is the result of principle, not of practice, and one who starts falsely only becomes worse by continuous false use. So far as this disease is concerned, the first prompting cause is the substitution of constriction at the fauces (K) for the true obstruction at the cords. A tightness is felt just under the jaws, and in a little while the speaker complains of his throat "aching." This substituted power subjects in its attainment the whole mucous membrane lining the parts above the organ of voice to a constant irritating process, which, gradually producing a chronic inflammation, may extend downward to the organ of voice itself. This state of congestion owes its first germ solely to false vocal production; so that, as "prevention is better than cure," there is *every necessity* for seeking in the larynx itself the power of rightly creating tone.*

The modern German school ("koo, koo") produces this disease by throttling tone. Constriction, friction, irritation, inflammation, congestion, and disease give its history. Garcia condemns this modern innovation thus:

"Some masters recommend the use of the syllables *pa, la, ma*, etc., in order to acquire precision in striking notes. This plan (by which the lips, the tongue, and other organs not concerned

* It is evident that a certain position of the mouth is to be chosen, which produces the best natural sound; that is, a sound which is most free from adulteration of the nose, the throat, the mouth, or the lips. Such a tone is neither, to speak accurately, *di petto* nor *di testa*, neither from the chest nor the head, but from a region somewhere between both, where it receives its last polish."
—Dr. Rennie, "Voice and Ear" (1826), p. 95.

in the emission of the voice are set in motion) has the disadvantage of *merely disguising the faulty articulation of the glottis*, without possessing any power whatever of correcting it" (Garcia, p. 9).

And the following case of congenital deformity completely refutes it: The patient could not produce any faucial explosives (X, K, Q); these all became aspirates; but full and true tone could be produced from the cords.

These are the attributes of voice in civilized man. We have (1) *tone*, or quality of sound having its special character from the *very nature* of the substance vibrating. This is a Universal Attribute. (2) *Hue*, a modification of *tone*, *artificially*, and often *unconsciously*, induced by the special requirements of the particular language spoken, in part Universal, in part a Particular Attribute. (3) *Taint*, a corruption of *hue*, produced either by pushing the peculiarities of the language to *extremes*, or by *direct efforts* to produce sound by false and unnatural means. We can whisper, and so detach words from voice; we can speak out loud, and so attach voice and words together; but we never learn how to detach voice from words, still less to possess the power of co-operation simultaneously, but independent each of the other. The sonorous quality observed in the speech of an Italian is owing to the "tonicity" having been retained, for vowels do not necessarily cause the tone, but they allow true vocal tone to grow simultaneously with, and correlatively to, the growth of speech. In English, on the other hand, the in-

duced weakness of the attracting muscles of the cords forces a compensating obstruction to grow elsewhere with the growth of our words, so that the preponderating vowel sound in English is *e*; physically, smashed air in the mouth gives our Anglican hue. As vocal tone does not exist in whispered words, and as the strength of it is found in the vowels, let the reader test this statement by picking out the vowels in any piece of English writing, uttering them aloud phonetically. No further proof will be needed to show which sound is mostly used.

The influence of climate in moulding a people's language is curious. In Northern countries the climate says, "Keep your blood warm; shut your mouth." These languages gravitate towards "thinness." In Southern countries the climate says, "Keep your blood cool; open your mouth." These languages gravitate towards "openness."

Then, to sum up this part, we find with increasing use of words an increasing principle of action throwing the horizontal force which produced vocal sound out of parallel lines, and, as a necessary consequence of this, we find the perpendicular force weakened; hence, on the principle of natural compensation, we find additional force brought from below by an act of Will, which force, owing to the wedge-shaped approach to the vocal cords, aggravates the evil by forcing open the true opposing means from which musical sound is emitted. That the English language is an *h*-producing one, anyone can readily see; and, taking

the converse, how many Englishmen *dare* utter loudly a word beginning with a vowel? If attempted, either it would not be done, or, in spite of the speaker, owing to weakness of the muscles which draw the cords together, an aspirate would precede the vowel. Thus the idiosyncrasy of our people's speech is deadness, weakness, and general feebleness. The letters *m* and *n* cause the soft palate to fall, and induce a "tinny" tone; the preponderating vowel *e*, causing the tongue to rise, lessens volume; while the aspirates *h*, *f*, *th*, *s*, *sh*, and *ch*, completely open the voice organs, and induce a habit of deadness of tone. This is the average adult voice falsely called "natural." All nations have their national taint induced on the voice by spoken words; but it suffices to show the Anglican taint, a true voice becoming cosmopolitan. The case stands thus: As breath is a condition of our life, it always goes on independently of us; but as the utilization of air in motion is voluntary, so we have between absolute openness and complete closure (this latter being the only possible means of true musical sound, as has been shown) all the varying degrees between the two positions; and the use of articulate speech conjoined with vocal utterance disturbs the normal balance of the latter, which was to be proved.

I consider this discovery, as regards the downfall of vocal tone, as most important. It will systematize tuition, words being selected to show a national warp, and set to music specially written to cure such.

A National School has yet to be founded on this base. Will it ever come?

However great a paradox it may seem, it remains true to all time, that the more beautiful a word as a sound, the more such word may frustrate its accepted function by clinging as a pleasing sensation in transit, for so clinging it does not use its full force to awaken or to evoke an idea; this is because the direction of thought, as embodied in spoken words, is always to hide or sink the material in the purely abstract spiritual. But when man speaks, the self-contained force conveyed by the "letter" is modified by an outer manifestation of "spirit," shown through other channels beside that of words. The effect produced by a speaker on an audience is twofold—(1) acute, (2) massive; if the stimulus be in words alone as such, then it is "acute"; but to be effectual in such case, each hearer must be in his desire of advancement, in his power of advancement by past culture, and in his innate faculty, within the limitation which affords him contact with the speaker's intelligence, or, in other words, both one and the other must be nearly upon a par. Mr. Ruskin says the same thing when he says no man can be rightly appreciated except by an equal or a superior; his inferior may underrate him in ignorance or overrate him in enthusiasm; but he can only be known by the former. In song and in a subtler sense in oratory, man is appealed to through *all* his powers of reception; hence the power and hence the charm. An orator, for one end, unites the forces found in Sensations, Impressions, and

Ideas, and he can only do this when he possesses absolute control over voice. Chronologically arranged, we get, first, the influence of tone ; approved by the people, the singer is next submitted to the test of the musician ; approved by this latter, he finally has to pass the judgment of the scholar, who not infrequently reverses the verdict of the musician. Higher training on the intellectual side is much needed in art.

There are other aspects of our subject which have been neglected. Vital force has a tendency to distribute itself over the whole circumference of the body ; it is, therefore, a sign of culture when a nerve-current is restricted to one set of muscles. There are movements tied together, as in the case of the eyes, which cannot be separated ; and there are associated movements acquired by continuous use, which in some cases require to be decomposed for a true use of either set of muscles. These acquired associations are brought about by the following natural law : Everything we do has a tendency to recur ; an act is easier the second time than the first, easier the third than the second, and so on ; finally we eliminate consciousness, and hand the mode of doing the thing over to habit ; we have to think to do it otherwise.

The following extract from Bain may serve as a metaphor :

“A stream of conscious nervous energy, no matter how stimulated, causes a muscular contraction—a second stream plays upon another muscle ; and the fact that these currents flow together

through the brain is sufficient to make a partial fusion of the two, which in time becomes a total fusion, so that one cannot be commenced without the other commencing also." And the same principle goes on in the spiritual as in the material existence: thus, the brain works unconsciously in the direction in which it has been propelled—thoughts, like actions, have a tendency to recur. What, then, do we learn? We see clearly that by spoken words we have built up a force in our minds, and a force in our physical construction, each of which has to be undone and new phases of thought and action built up and made "secondarily automatic" before a man can venture to proclaim himself an orator or a singer. In other words, we must use our instrument in accordance with Nature's laws, and be able to play upon it simultaneously with, but independently of, spoken words; that is, we must undo the association between the parts producing consonants and the parts producing vocal tone. Whether it be oratory or song, it is all one; song is but an inferior species of oratory, with an exaggerated force of rudimentary component parts. It is inferior in so far as the modulation of it is the composer's and not the reproducer's; the inflection is divided between the composer and the reproducer, while the thought, the soul of the song, is conveyed by the words which form its body, and these, as we know, are the author's alone, while the music is but the clothing. Both orator and singer meet in the colouring of voice by the spirit acting through tone.

Here is oratory presented in a tabular form :

Fundamental qualifications	{	Of mind	{	Developed intellect
				Knowledge of language—the neutral ground, or mediant between actor and recipient
				Retentive memory
				Rhetoric
				Logic
Accessory qualifications	{	Of matter	{	Perfect control over the conveying medium, the organs of vocal utterance and articulate speech
				...Action
		Of manner	{	Inflection—power and softness
		Of style		Modulation—cadence
		Of delivery		Quality
Of sense (sensuous)	Smoothness			
	Volume			
			Intensity	

Tone is the basis of all vocal emotional expression ; it is a direct presentation of a sensuous pleasure. But it can become more ; through it can be given a direct presentation of an inward natural beauty of soul which no words whatever can convey. Whether in song or speech, a control over the means of producing this tone is the first step, the first essential of good performance, for tone alone has the power to individualize the impersonality conveyed in a word. The flash of the eye in anger and its beam in love are inexplicable to the biologist, and beyond his sphere, but these are not less real because mechanically unexplained.

It is the physiologist's duty to explain the construction of parts ; it is the surgeon's province to readjust parts mutually disarranged, to readjust a disturbed relationship, but not necessarily to explain the physiology of the parts affected, and this

surgical work always precedes the application of a power for a given end ; finally, it is the voice-trainer's duty to explain principles of readjustment. The question for a speaker or singer is not so much how the thing acts, but how to get it to act aright, when not so acting—purely a surgical question. Nature has so created us that when in health we do not feel we have parts ; consciousness without sensation is a law ; to feel we have a tooth is to have a toothache. Pain is the index of error, and violence is the forerunner of pain. Actions acquired and rendered automatic are known to us through consciousness, never through feelings. So in song and speech, Nature tells us we only sing aright when consciousness informs us of the fact ; if we “feel,” we abuse the laws of our construction by erroneous use. We hear ourselves sing, but do not feel ourselves doing it. We determine the pitch, the power, and in part the quality, but Nature, not ourselves, produces the foundation tone.

During the last twenty years more writing and still more talk has been expended upon the question of voice than in all preceding time ; yet past history proves, by the superior results which it records, that a method of training *did* once exist, which, so far as it went, was true in first principles, while *contemporaneous* history shows, by the *failure* it records, that this method is for the most part lost.

Let it be observed, the study of the voice is not like the study of an instrument detached from man ; in this latter, everyone commences equally incapable

of the desired control, but in voice a partial control may actually exist. In some cases students, having accidentally retained or dropped into the method of true vocal emission, have learned singing from a musician, and the master has been unjustly accredited with the result of the voice beyond its specific musical training. In order to sustain such reputation, treatises containing visionary and imaginative theories on voice have been published, which accounts for the numerous theories conflicting; nor had the few men who taught truth the power to prove, on scientific grounds, the correctness of their teaching and the fallacies of their opponents; so now, midst all the talk and all the printed works on vocal art, we find but one book that instructs the first step to after-excellence, which step it is our duty to rescue from surrounding error.

Voice production affects the pulpit, the platform and the stage; the principles of restoration should be known to every national school teacher throughout the kingdom, and especially should they be known to every medical practitioner, for voice production embraces a far wider sphere than music, and penetrates where the latter never enters. It is said, "Prevention is better than cure"; by true use of voice chest disease, in many who have its tendency, could be successfully warded off—this because a greater consumption of carbon takes place, quickening circulation and hastening digestion, so that true speakers and singers feel only hunger after work. Purely as a question of health, the

voice should be cultivated collaterally with the culture of words; both spoken words and vocal tone should grow up together, but each power should be taught in its specific mode.* While medical men have often recommended the healthful exercise of song, they have never made their word of worth by troubling to go deeper into the question and deciding what work is right work, what wrong; this they should now do. We know how important it is to change the air we breathe, so that what we take in be not vitiated; how much more important, then, that the air within us be pure, and be not portable poison; yet all cannot be thoroughly vitalized within us unless we take either violent bodily exercise or obtain true use of voice. But in degree attention has been drawn by outsiders to this matter, and singing, under the generic term "music," has been introduced into our national training schools. Unfortunately the two methods in use are worse than useless, for while professing to teach "music," these methods destroy in more rapid degree than spoken words the true conditions imposed by Nature for producing vocal tone.

The first thing logically done in order to generate in a person a perception of a difference is to remove all differences but the one required to be perceived, for by so doing no extraneous contrasts

* The only position regarding the voice tenable by the musician as such is that of beginning training from earliest years of life, for such a position is based upon a principle of Conservation instead of Restoration. See "Conservation and Restoration, or the Two Paths," by the Author.

distract the observer's attention from the required point. An uttered word or syllable received by a listener for the first time appeals to him solely as a new sensation, and in his mind is unconnected with other perceptions; the sound expresses nothing, evokes nothing; it is a noise pure and simple, and can never stand as a symbol of another thing unless a perception of that thing be possessed and association has taken place in the mind between the two perceptions, the noise and the thing. As the ultimate test of discernment is shown in a person's subtlety of perception—that is, in seeing minuteness of gradation either in sound or colour, it is necessary, in order to evoke first perceptions in sound, to take for beginners, even for strengthening speech, some broad differences; hence the rudiments of music are rightly used as the simplest means of voice training.* Music is accepted pleasurable sounds relatively arranged in successive, or in simultaneous and successive order. The perception of an interval or distance between two sounds is either possessed or it is not; if a person has it, he does not want to learn it; if he has it not, no uttering of syllables can evoke it, for the two perceptions have not been associated, so do not cohere; we cannot awaken what has never slumbered. A word, then, always *follows*, never *precedes*, the perception of the thing for which it stands; so it may be affirmed both “movable”

* I have elaborated this into some principles for training what is erroneously called “no ear,” but the rules are more suited for a primer than for this.

and "immovable" words *impede* the desired discernment of difference between two sounds of different pitch by bringing in other extraneous and confusing differences not required to be perceived. A man can readily identify the pitch of a note when sounded in a familiar voice, but "on a strange instrument it is less easy to make out the identity; the change of quality in the note, the greater or less emphasis, the different duration of the sound—as in comparing the piano with an organ—all tend to *disguise* the pitch, and to render a more delicate or a more cultivated ear necessary for its discernment" (Bain). The position, then, of most teachers, so far as song is concerned, is this: The association of words with vocal tone by long use fuses together two or more sets of vital currents flowing simultaneously through the brain, which currents mutually influence each other to the hindrance of a required simple perception; next, a particular association is induced, under the belief of culture, by joining set syllables to given sounds, and thus aggravating the evil. This association has afterwards, by long practice, to be decomposed, in order that ever-varying and different words may be used with similar distances in sound—in brief, people virtually start with an induced error and pay to add a fresh one.

What Dr. Wyllie stated as the result of his experiments upon the detached larynx holds with equal force in the living subject. If the strength of such comparatively minute structures as the intrinsic muscles of the larynx which close the edges of the

cords be insufficient of itself to withstand the automatic chest force brought to bear upon the true cords, it must be equally true that these muscles cannot of themselves supply sufficient resistance to overcome the force of air when producing vocal tone; therefore there must be an inverse force removing the strain: for if there be not, the air acting from below upon the vocal cords will wedge them out of their parallel lines, not by their natural elasticity yielding to pressure, but by the attracting power which brings them together giving way; the cords would, in fact, be forced to resume in degree their state of repose, presenting a fissure of a triangular form, a form incompatible with the production of true musical sound.* We know that the contraction of any muscle demands two fixed points of resistance at its extremities, and if one of these break loose the force of contraction has nothing to expend itself upon, and thus a false position is incurred. In false emission, as induced by spoken words, the chambers are *not* inflated; thus, the muscles which draw together the vocal cords have to bear the brunt of the whole chest pressure, and, being of themselves too feeble to resist, of course succumb, and that is the sole reason of all feebleness and incapacity. So that my discovery of the use of the false cords and the ventricles just amounts to this: It proves that

* This balance of forces presents a subtle question of hydrodynamics. There is the perpendicular balance between the diaphragm and the larynx, and there is the horizontal balance between the permanent and the temporary point of impact of the cords: the first is dependent upon the second, and the second is dependent upon the first.

Nature has ordained compensating forces, under which condition the minute muscles of the larynx can accurately act, but that under less favourable conditions these muscles can only partially fulfil the functions for which they are destined; this is in strict conformity with Nature's universal principle of "least action" (see Rev. Dr. Haughton on "Animal Mechanics"). In true song or speech the work of counterbalancing different degrees of pressure from below is done by the air being inverted, and forming an eddy in the chambers or spaces between the true and false cords. This is proved (1) by the fact that under the conditions of true sound the chambers can be felt to be puffed out, while with false sounds they are not so felt; this accounts for the breadth of throat in public singers (my throat grew $2\frac{1}{2}$ inches while studying). (2) A true vocalist does not feel as though he were forcing air out, but as though he were actually drawing breath in, and this even when emitting the most powerful sound: in false emission it is not so; the point of resistance breaking loose makes him feel as though he were running after a note to catch it.* (3) A true vocalist *knows* but does not *feel* he is singing; consciousness is the sole guide. (4) Under such conditions the sound can be sustained at full force for a considerable time, showing

* This psychological test is thus curiously perverted in a work that attracted an ephemeral attention: "If you have a feeling as though it (the note) went away from you, and you had to run after it to catch it, it will never be a 'telling' tone." I did not write of a man's *present* feelings of a *past* act in relation to the *future*; I wrote of an actual feeling at the present during false production of voice.

the economy of Nature; and the sound can be increased inversely to the quantity of air held in the reservoir below, this too, without studying the *crescendo* and *diminuendo*. Power, beauty, ease, and endurance are four different aspects resulting from the same state of balance. But in false song or false speech the instrument of music is only used to partially catch the air in transit, and owing to this artificial and imperfect mode of use it cannot resist the full force from below. *All* consonants throw open the false cords; some throw open both these and the true cords. In producing consonants the Will is *never* located on the false cords, and only by reflex action on the true. By speech the Will is diffused and distributed *away* from the vocal organs, and utilized in different and remote localities, and applied in a different direction to the physical laws meant to rule the vocal organs as a musical instrument. The voice trainer's business, mentally, is to *accumulate* the Will power, *locate* its application, and *reverse* its distributed direction.

Here I would ask the reader to pause and inquire: Have I, or have I not, made out my case that language induces a local weakness? For if I have, this follows: All teaching that does not appeal directly to the correction of this weakness is false. Now, as I read history, nothing can show the failure of modern teaching more than the high price demanded by public vocalists, for price is regulated by demand and supply. Moreover, the number of those who excel compared with the number in past years is, one would think, conclusive proof of the truth of

the old system. If, then, spoken words disturb a resisting force, we must admit that the cause of such wholesale destruction of voices as we see prevails amongst the multitudinous students who study must be owing to teachers appealing for results to chest *pressure* or false resistance, rather than to readjustment of *local resistance*; for while speech disturbs, such tuition aggravates evil and destroys.

This physiological fact was forced upon my perception by noticing that after a long day's work at teaching my voice "gave," and would not respond to my will. It was warped by its use with consonants. Now, we know that new habits crowd out old ones; and although I had had from early March, 1860, to the middle of August, 1863, close study in Italy, still, the new habit was not sufficiently strong, as it now is, to overcome the old one. Not until voice and the parts of speech become as isolated as an organist's feet are from his hands in playing can a person properly sing. When this fact is discerned and rightly applied by musicians, it will do more to organize a systematic course of vocal retraction from physical error than anything else I know. When will it come?

It is said, "Prevention is better than cure."

The sooner we begin to learn truth, the less there is to unlearn, and the easier is truth acquired. This is both a physical and moral law.

"A prevalent opinion exists that it is dangerous to commence the study of singing before the age of fourteen or fifteen; but this is erroneous. Children

may commence singing at the age of five or six years" (Novello).

In the *Strand Magazine* for March, 1891, appeared an account of Madame Albani being interviewed, and she is reported to have said :

"I have heard him [her father] say that I sang before I talked. When I was four my mother also looked after my musical training, and a year later I was practising five and six hours every day. I often used to practise then two hours every morning before breakfast, and get through a hundred and fifty pages of music a day. When I was seven my mother died, and I can yet remember how one morning my father suddenly came into the room, and stood at the door with a surprised look, as he listened to me singing my favourite little bits out of such operas as 'Lucrezia Borgia,' 'Martha,' and 'Norma.'"

The history of Patti is somewhat similar; and Miss Ella Russell, whose voice I specially diagnosed for "Die Menschliche Stimme," said she never remembers the time she did not sing. She sang me four F's



PART II.

IN vocal science the opinions of accomplished musicians and successful vocalists, given in good faith, are always to be taken with reserve. The superficial aspect of a thing is generally opposed to the true and scientific aspect of it; for example, we put a stick half in water and it looks bent. The superficial observer would say, "Water is so strong that it will bend a stick." An inquiring mind, wishing the truth, feels down the stick, and, lo! it is found to be straight! The scientist then steps in, and, by explaining the law of refraction, blots out the error of the wrong impression. Vocal art rests on poetic superficiality, as painting does, but science reveals the hidden causes of effects. I could give many examples of erroneous thought, honestly expressed, by well-known singers and musicians in England, but will content myself with only one outside.

M. Jules Audubert in his work on voice says: "Nous proscrivons, de la manière la plus absolue, l'attaque par la coup de glotte, préconisé par Garcia, parceque cette manière d'attaquer le son

fait entendre une secousse (jolt), une espèce de hoquet (hiccough) contraire aux principes de l'art musical" (p. 24).

A "hiccough" is an involuntary intraction of the air; a "jolt" is a voluntary expulsion of it. Probably Garcia and myself would condemn with greater vigour such errors, because we should *know* what we are condemning; but this gentleman invents a misconception in *ignorance*, and condemns his own "imaginings." Artists and musicians give "opinions," but they must be scholars to form a "judgment."

The following is extracted from the *New York Musical Courier* for September last :

"After one or two years of study a young singer is launched on the stage as an artiste (?). Perhaps she has in a measure mastered the music she essays to sing, and Nature having endowed her with beauty and dramatic talent, she is considered a success. After a few years she is heard of no more—the voice is lost ! When next she appears it is as a celebrated teacher (?)—alas ! of what ?" This, then, is a reign of Anarchy.

Two thousand nine hundred and thirty-six years ago they knew better :

"And Chenaniah, chief of the Levites, *was* for song : he instructed about the song, because he *was* skilful" (1 Chron. xv. 22).

In the Douay version it says, "for he was very skilful." In the Revised Version it says, "he instructed about the song, because he was skilful." Can we once more approach the Reign of Law ?

The following rules are written for the training of the adult disturbed voice, and the test of a system is what it will do under the most adverse circumstances.

SUMMARY.

1. Mechanical pressure.
2. Location of will.
3. Vocal poise.
4. Compression of air.
5. Self-productiveness of voice.
6. The selected vowel.
7. Retention of conditions shown by equal power.
8. Muscular development.
9. Mental ease.
10. Inversion of will and reversion of habit.
11. Natural economy.
12. Forecast.
13. Reproduction.
14. Vocal harmonics.
15. The æsthetics of voice.
16. Artistic liberty.
17. Reinforcement.
18. Mental stimulus through sound.
19. The principles of self-possession.
20. Testimony of consciousness.

SCHOOL.

First Law.—Complete inflation ; in other words, suck in as much air as can possibly be drawn in. Fluids press equally in all directions, and what we have to do is to get as much air in as we possibly can. The following extract from Sir Morell

Mackenzie's "Hygiene of the Vocal Organs" (p. 71, third edition) will show how falsely modern teachers act: "The old Italian masters taught that in inspiration the anterior abdominal wall should be slightly *drawn in*, and this method was practised for more than a hundred and fifty years; but in 1855 Mandl opposed this mode of breathing, on anatomical grounds, maintaining that the descent of the diaphragm is facilitated by allowing the abdominal wall to be flaccid and to project forward in inspiration. In England the views of Mandl have been advocated by Messrs. Browne and Behnke, and I was myself inclined to accept these doctrines. I felt some misgivings, however, on the subject, more especially as Gottfried Weber, one of the most acute investigators who had studied the science of singing, says that it is impossible to explain why it is so, but that undoubtedly the old Italian method is the best. In the early editions of this work I endeavoured to harmonize the conflicting views, but further investigation of the subject has convinced me that the old *maëstri* were right, and that in the abdominal cavity there is ample room for the slight descent of the diaphragm without any protrusion of its anterior walls. I hope to publish the results of my experiments and observations before long, but in the meantime I may remark that by the old Italian method complete control is obtained at the commencement of the act of expiration, and undue escape of air—i.e., waste of breath—is thus prevented. In other words, by the Italian system greater effect is pro-

duced with less expenditure of force.”* And this will show the method I learned from Cattaneo: “In order to inspire freely, hold the head straight, the shoulders thrown back without stiffness, and the chest open. *Raise* the chest by a slow and regular motion, and *draw in* the stomach. The moment that you commence executing these two motions the lungs will proceed to dilate themselves until they are filled with air” (Garcia on “Respiration”).

To put it another way: The more a person standing upright breathes horizontally by expanding the free ribs, the better the result—*i.e.*, draw in the viscera.

“Strengthen respiration by inhaling breath, retaining it as long as possible—the chest expanded, the stomach compressed and flattened”—(Novello).

The modern false methods of teaching people to breathe never have produced, nor ever will produce, a compeer to the great old forgotten school of Italy.

Never practise breathing exercises lying down. The breathing capacity of a person lying down is much less than that of one standing up. See “National Encyclopædia,” vol. x., p. 848.

The moral is obvious: Before confiding in a teacher, make him display his own voice, and judge by its beauty and his control of it whether he ~~be~~ or ~~be~~ not a practical man.

Second Law.—Our first object is to tie the Will to the instrument. Our next to dissociate the habits of connection that have grown up in our

* I induced Sir Morell Mackenzie to make a number of experiments on living singers and myself, with the above result.

spoken words. As a pianist's hands have to be independent of each other, but capable of simultaneous use, so a vocalist's voice and parts of speech have to be independent of each other. We play a sonata on the larynx and at the same time utter words.

Placing the Will.—In order to find out where the voice is made, let the student place his finger on the Adam's apple, or point in his throat just about above the collar. Read in whispered words part of a sentence slowly; then gradually, while reading, transfer the manner to words uttered aloud; then fall back again slowly to whispered words; he will feel the vibration of the vocal instrument underneath his finger-tip, and this will prevent him being misled by the terms "head" and "chest" voice. Next, let the student again put his finger on the same spot and swallow: the part will be felt to rise, and he cannot swallow without its rising. When that rises, both the upper and lower parts (see sketch, p. 72), close, and they close in *spite*, not in consequence, of his Will. Then we get this: Under certain conditions *openness* is the law, while under certain other conditions *closure* is the law. This latter was the old school we are about to study and to prove.

The importance of metaphysical training is easily shown. There are strong and healthy men who, in the prime of life, are said to have "lost their voice." Science has given no possible explanation of this. The fact is, the singer has not lost his singing voice at all; he has only forgotten how he did it, so cannot recall it. He produced his voice

originally aright *by accident*; from some cause or other, probably a slight cold, it became temporarily disturbed: he tried a new way and it would not come, he forgot the first way, and so "lost his voice." With all the physical conditions as perfect as in the outset, he cannot sing—simply for want of knowledge.

As Signor Garcia is the most prominent writer who represents the old school, we will take his principles, as far as they go, and explain them. But first for definitions. The larynx is the name given to the case in which the whole instrument is enclosed, and it is the larynx which we feel to rise when swallowing. The "glottis" is the name given to the opening between the true vocal cords (p. 72). He writes:

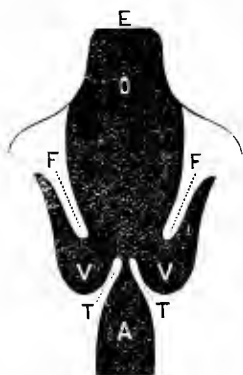
"No person can ever be a skilful singer without possessing the art of governing the respiration," and no person can govern respiration without having control of the point of resistance. This is a self-evident truth; it remained for science to show how this entire control is *lost*, on what material conditions *it depends*, and how it can be *regained*.

"Emission should be made as tardily as possible; and the student will do well to consider breath more as a propelling power which sends forth sound *by remaining behind it*, than as the sound itself" (Novello).

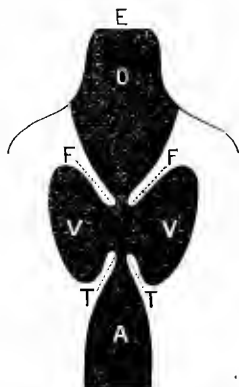
"Let the master [says Tosi] attend with great care to the voice of the scholar, which—whether it be *di petto* or *di testa*—should always come forth neat and clear, without passing through the nose or

being choked in the throat, which are two of the most horrible defects in a singer.' This power I conceive to be that which the masters of the great Roman school called *portamento*, coupled, however, with the given support of the tone" (Bacon).

Below are given two illustrations, one showing the form of the voice organs after twenty years of neglect or imperfect use, the other showing the form of the parts in right relationship to each other for the production of beautiful unfelt sound.



Section of Voice Organs producing voice falsely, incapable of ruling the escaping air. Outlined from Dr. Gordon Holmes.



Section of Voice Organs producing voice artistically, *i.e.*, false cords approaching, ruling, and resisting the stream of air.

Black = Space.
White = Solids.

A—Angular approach from chest.
V—Ventricles or caverns.
O—Outlet from below.

T—True vocal cords.
F—False cords.
E—Epiglottis.

There are two conditions for the conversion of one form into the other, one instantaneous (surgical),

the other dependent upon practice (muscular growth). For example: An arm is either in its socket or it is not; if it be not, no playing of the piano will put it right; but if it be in its socket, it may yet be a feeble arm.* The setting of a dislocated arm is one thing, the development of its muscles is another. In like manner of the voice: the voice organs *must* be set right before we can rightly play upon them, but the development of their rightly used muscles is dependent upon time and work.

A beautiful illustration of good production is found by blowing out the cheeks and putting vocal tone in it. What the compressed air in the blown-out cheeks when sounding the buzzed sustained consonant *b* is to our vocal tone, associated with lip-resistance, that the compressed air in the blown-out ventricles is to the *invisible* but artistic voice. In brief, the set *A* of the old school is suppressed escape at false cords with voice added to it, and this physical equilibrium—the hydrostatics of voice—has its mental equivalent, a perfect physically unfelt control. The *superior* laryngeal nerve (4) acts upon the crico-thyroid muscle and the inferior constrictor muscle. The crico-thyroid muscle pulls together the thyroid and cricoid cartilages, *both ascending*, and the effect of this action is to tighten the vocal cords, and consequently to raise the pitch.

* “A month or so ago a gentleman, whose vocal powers had never been encouraged, and who had often been told that he had not even the proverbial two notes, put himself under instruction, and in less than twenty minutes was delighted to find he had two octaves of serviceable notes to begin with.”—“First Principles,” T. Kelly, S.J., p. 11.

This intrinsic muscle owes its action to a nerve-energy directed *downwards* through the superior laryngeal nerve (4). Thus much for direction of Will or thinking *downwards* against the initial *automatic* upward pressure.



- 1.—Seat of thought.
- 2.—Pneumogastric nerve.
- 3.—Pharyngeal nerve.
- 4.—Superior laryngeal nerve.
- 5.—Inferior laryngeal nerve.
- 6.—Larynx.
- 7.—Windpipe.

Next, at the outer side and over the *top* of each ventricle is placed a number of muscular fibres, the function of which is to *resist* the strain of the compressed air brought to bear upon them by pressure within the ventricles; and it is known that there is an abundant supply of nerve-branches from the superior laryngeal nerve distributed to each ventricle. These nerves are placed there to inform consciousness of the varying degrees of pressure brought to bear from within upon the tense and distended surface of the ventricles.

We will to local vital force.

Third Law.—Hold the breath. The object of this is to stay all movement. The statical side of the question comes first, afterwards the dynamical side. When we are first learning to do a thing, we pause to take aim, for it is more difficult to hit a moving thing than it is to hit a stationary one. Garcia nearly had the explanation of true production when he used the word “accumulation,” but the word “momentarily” spoilt it. When the air is only momentarily accumulated the instrument has slipped; the start is right, but the continuation of tone is wrong, owing to F F' (p. 72) springing too widely open. In right production the compression of air can be continuous. This slipping of the higher part of the instrument is a common fault with beginners. Others, hearing the difference between the ring of the attack and the feebleness and deadness of the rest of the note, condemn unjustly and in ignorance the attack as unmusical, instead of condemning, as they should condemn, the continuation of the note for not being equal to its first start.

“Every proper opportunity of taking breath should be seized, so as to keep the lungs constantly replenished with fresh air, and save the chest superfluous fatigue” (Novello).

Fourth Law.—Squeeze this imprisoned breath as much as possible by a general contraction of all the chest muscles and elevation of the diaphragm; this act compresses the air within us. Under this condition F F and T T (p. 72) are brought together.

This imprisoned air, when so acted upon, inflates the caverns (V) that lie between the false and true cords. The air catching in these caverns presses up the larynx and tightly closes it, and by tension makes the elastic pipe below, not only straight, but of greatest circumference, with the acoustical result of greatest sonority. We have transferred from our minds to a quite natural physical law independent of mind, the power that shut the door and imprisoned the air below. Our minds have to act downwards to *undo* the natural resistance. Why should we make voice a question of personal work, when the voice under certain physical conditions will act for us automatically? We have, then, to withdraw the pressure a little before we can allow any self-escape of air. The old school always studied for highest elevation of the larynx, inflated caverns, on which the massiveness or volume of voice chiefly depends, and mechanical closure. By way of illustration: If we hold our breath by closing the mouth and nose, and squeeze the imprisoned air, we feel the air forcing its way up the tubes that go to the ears, and we find the drums of the ears pressed against from the inside. This is exactly what the air does in the caverns (p. 72) in right production, holding the instrument distended and tight like the inflated sails of a ship under pressure of wind. When the old masters advised students to *appoggiare la voce* (prop up the voice), they meant prop up the instrument that produces it.*

* The value of compression is shown in the organ, the solo stops being made prominent by added pressure of wind.

The following quotation of the old school is to the point :

“Domenico Corri, a disciple of Porpora, and resident pupil for five years, attributes (about 1790) false singing to a bad habit, ‘occasioned chiefly by the *relaxation of the windpipe*, and to the other organs not having attained sufficient strength and tone.’ ”

The tightness of the pipe is owing to physical expansion from within, this owing to resistance of escape ; false and injurious tightness is owing to constriction, the result of will-force trying to contradict and overcome physical law.

“ In preparing respiration for vocalizing purposes, the chest and muscles below should be kept *permanently expanded* ” (Novello).

The action of the larynx is a source of much false thought, owing to persons reasoning from a “ Particular ” to a “ Universal,” a principle denied in logic. It must be borne in mind that overlying the law of a species there are individual diversities. In swallowing the larynx closes in spite of will—it must close. In other localities it can close in response to will or in spite of it. In inspiration the larynx is drawn down a little in some, a great deal in others, and in varying degrees. In all it is dragged down deepest the quicker we inspire. Let us take two extreme cases. A has larynx drawn down in least degree, B in greatest. This is owing to individual differences in form of chest, and different degree of angle of setting the bronchi to the trachea.

Both A and B can close the larynx in its lowered position by an act of will. Each can compress the air below and within it, and then the larynx will be pressed up from its then condition and closed in spite of will. In one it will be blown up above its normal state of open repose, in another it will not, but in each it will be raised above its state when voluntary closure took place, and this is the high larynx school of the past.

Fifth Law.—The valvular action or attack. By ceasing to will to hold, an explosion of the compressed air takes place. This explosion is nothing more nor less than the first cry as presented by infant life, and is practically the same as what is called “the shock of glottis”; it is an audible result arising from the false cords, in response to will, opening a little, and releasing compressed air imprisoned below them, which air in its release explodes, the true cords springing of their own elasticity, and consequently automatically giving off their intrinsic tone. That is, the instrument falls a little, or no air could escape, and our object is to get the least fall, and so retain the smallest fissure, and therefore the least waste of air, and consequently longest note. Now, either (1) the false cords may act in unison with the true, alternating, as in laughter, between approximation and disjunction, like scissors. Or (2) the false cords may part so widely that they are unable to rule the air—this is ordinary or false production, the true cords vibrating *on* a column of uncompressed air, which they cannot completely restrain; in effect

weak, dead, or rough uncontrollable sound. Or (3) the true cords may completely open, the false cords being partially approached, in which case the air is heard to escape in a controlled hiss. Or (4) the false cords alone may slightly separate, assuming a fixed position, restraining the escape of vocalized air, while the true cords of themselves, by their own elasticity, alternate between parallel lines and ovals. *This last alternative is true production.* This first step of voice restoration is only an application of the automatic action that takes place at birth, and an application of this can alone enable the speaker to utter loudly any word beginning with a vowel ; it is a sharpening of the energy of the organs of voice, just as *b* is sharpened into *p* by the action of the lips—an automatic grip.

This is Garcia's rule : " Keep the tongue relaxed and motionless, avert the base of the pillars, and render the whole throat supple." (Better have said, Breathe through the open mouth, but feel no parts.) " In this position breathe slowly and long. After being thus prepared, without stiffening either the larynx or any other part of the body, calmly and with ease attack the tones very neatly by a slight motion of the glottis on the vowel *a*, very clear ; this motion of the glottis is to be prepared by closing it, which momentarily arrests and accumulates the air in this passage ; then, as suddenly as the pulling of a trigger, it must be opened by a loud and vigorous shock, like the action of the lips energetically pronouncing the letter *p*." And he adds : " This first lesson should be insisted

on, as it is the *basis* of all teaching. I again recommend the shock of the glottis as the *only* means of attaining the sounds purely and without bungling." Now, this, small though it be, is the one important principle of training that has been successful in results ; by it great singers have been made ; without it, many possessing all other requirements have failed, and it served its purpose before the introduction of the laryngoscope. We have to see what this "shock of the glottis" is ; why it restores the instrument to its natural conditions for creating sound ; and how Nature acts when rightly used.

My dead pupil, M. Orlando Steed, and myself have been misrepresented as proclaiming a different action to that written of by Garcia, but it is not so : we only proclaimed a different explanation of the same act ; but we showed the self-productiveness of voice in its first principle, which Garcia did not show. For example, if we pull a harp-string, the string in like manner pulls against us ; there is a distinct act of will in us, but there is no sound in space. It is only when we *release* the string by *ceasing* to will that the string of its *own nature* produces sound. The voice in man, properly set as in the bird, must produce itself ; but being possessed by life within its limits, life informs it what to produce. By way of illustration, if we drive a thoroughbred horse our will is only used in *restraining* and *controlling* it, and we have only to decrease our will—or, in other words, remove our opposition to the nature of the horse—for the horse

to increase its speed ; on the other hand, if we have a broken-down hack, we increase the use of our will through whip or spur to increase speed. The latter illustrates false production and its fatigue ; the former illustrates true production and its ease. Remembering this, one production is easily distinguished from the other by a student.

Alexander Melville Bell says : “ In the production of a pure glottal sound, there is a sharp and instantaneous opening of the voice, as if from a momentary holding in of the breath before the vocal emission. The effect is a great beauty in vocalizing ; a source of ease, power and distinctness, as well as of grace. When the voice is otherwise commenced, much breath is wasted before vocality is obtained, and a clear, resonant voice can hardly be produced by the loose expiration. M. Garcia, of Paris, and other scientific singing-masters prescribe exercises on the *coup de la glotte* as the best means of purifying and strengthening the vocal tones ” (“ Principles of Speech and Vocal Physiology,” Edinburgh, 1863).

Madame Marchesi, in her work “ Theoretical and Practical Method of Singing,” writes : “ The lungs once filled, the pupil, in order to produce a sound, must close the glottis *hermetically*, in order that the air, in making its way through the opening of this glottis at the moment of expiration, shall set in vibration the vocal cords which form the extreme edges of its lips. The *coup de glotte* is then caused by the sudden and energetic drawing together of the lips of the glottis an instant before expiration

commences. This organic action, which forms that attack or 'pose of the voice,' is caused in preparing the glottis and mouth for the production of some vowel."

In an authorized Latin translation in the British Museum (1550), Galen, who lived sixteen hundred years ago, is made to say, "Vox est aer percussus," that is, Voice is stagnant air struck, or the exact opposite to shoved air snatched at.

Sixth Law.—The selected vowel. When a child sobs it sucks in two or three (generally three) inhalations, and the coldness of the drawn-in air causes reflex action, and so shuts the larynx. The internal heat, acting on this cold air, expands it, and the closure of the larynx is no longer the result of reflex action, but is transferred to that of air pressure. The heart, wanting to go on with its work, induces in its turn reflex action, which releases the imprisoned air, and the cords in their spring give off sound, the result of their intrinsic nature—and this is the *coup de glotte*. Now let us go from the cradle to the grave. With death the jaw drops, and the last exhalation is Ah. This is purely an acoustical result from simple physical causes. All other vowel sounds are complex, owing to the cavern being moulded by will. The first is physical, the second metaphysical. "The ideal tone aimed at by Garcia" is the first, and is right because it is Nature revealing itself. The difficulty is to get pupils to realize this, and what many in ignorance call the *coup de glotte* is violence—will-force located on the diaphragm, or

distributed down the ganglionic centres ; and this I condemn.

Marchesi writes : “ The type of vowel to be prepared and chosen for the formation and development of the voice is that of *a*, attacking it naturally and without any effort or affectation. The pupil must understand that the *coup de glotte* is a normal movement of his vocal organ, and that he must *simply submit to a spontaneous action* [italics mine] which has developed from the moment he commenced to cry in coming into the world.”

“ Students usually commence practice either with *solfeggi* or *vocalization*. In the former, each note is named as it is sung ; in the latter, one vowel—the Italian *a* (*ah*)—is used throughout.

“ The great object being, at first, to develop the voice, *vocalization* is much to be preferred, as the pure vowel induces a pure tone of voice, which eventually becomes habitual. Until the voice has been examined, and its registers distinctly recognised, words only serve to veil any defective note.

“ It will be advisable to sing *at first* without words, which can be added when all the musical distances have been well impressed on the ear and mechanical action of the throat. This latter should retain the attitude assumed during the production of *vocalized* sound [i.e., least change of state].

“ The habit of *humming*, or singing with the mouth closed, is injurious to the voice, which, by a false position assumed by the vocal apparatus, is emitted through improper channels ” (Novello).

“If our alphabet be critically examined, in order to discover the effect which each letter has upon the voice in singing, it will be found that peculiar letters, as well as combinations of letters, have peculiar vices and tendencies to impede or corrupt musical sounds, both in their formation and passage.

“Perhaps we may trace certain national vitiations of tone in singing to the predominance of peculiar actions of the organs of speech in pronouncing the several languages.

“The tone must never be vitiated, even if modified—so says the rule—and to this we adhere with unbending scrupulosity.

“I differ from the instruction books so far as to think that this should never be tried till the confirmation of tone and tune be completely and assuredly fixed by habit upon the syllable *ah*” (Bacon).

Fetis wrote of the evil of sol-fa thus :

“It had for its inevitable effect to destroy the voices in the very beginning, by ignorance of what concerns the delivery of the voice, and vocalization. This is completely unknown to the majority of masters of *solfeggio*.”

Solfeggi were introduced because a number of teachers arose who could not train a level tone, and to distract by a pretty tune the student from his own stagnation this mode was invented.

Mr. Kelly, in his “First Principles of Voice Production,” says : “When speaking or singing, we should try to get the mouth into the most

natural position possible. This will be best seen when the muscles of the mouth and tongue are no longer under the control of the will; when life is extinct the lower jaw then falls, and becomes similar in shape to that in which our mouth is when we are pronouncing the vowel *a*."

Domenico Corri says: "Here I may quote my preceptor, Porpora: The improvement of the voice is best acquired by sounding the letter *a*, the position of the mouth in uttering this latter being most favourable to produce a clear and free tone."

Then again, Celoni, in his "Grammar or Rules for Beautiful Singing," says: "The vowels *i* and *u* one ought to avoid, and leave them to those who have the madness to imitate horses and wolves." And Maccini: "*I* and *u* our profession call vowels prohibited."

Seventh Law.—Equal power. Continuity of tone naturally results from retaining by an act of Will the conditions assumed in the outset by Nature. There is to be noted a vital difference between training the voice and learning to play upon an artificial instrument. The voice-organs are part of our being; and if we possess control over any part of our being, Nature defines the limit, and our Will regulates the degree. Variableness, then, is in response to *will*, the instrument being placed; but in training to control an artificial instrument, we have to learn all the varying degrees of force that are required to produce varying degrees of sound. Moreover, in ruling an external inanimate instru-

ment we will the process ; but in ruling our bodies we will, not the process, but the end.*

The old school used equal power to ensure no change of state in the relationship of the parts each to the other. The point for study is precisely the intensity of beautiful sound ; so a beginner should sustain each note in a perfectly equal power ; thus :



not thus :



The first demand of the dramatic instinct is for a safe, unwavering, powerful *fortissimo*. Never study at beginning short staccato notes ; it makes the tones unsteady, and the instrument will never set. The power to end well is as important as to begin well.

In Manuel Garcia's book, published in 1824, we are told :

"All the exercises must be studied with the most strict attention to their distinctness, and *not* in the *staccato* manner, so that the unpleasant sounds of hà, hè, hì, hò, hù may never be heard.

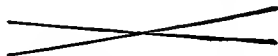
"The position of the body must be erect without *distorting* the appearance either in face or body."

The *crescendo* and *diminuendo* are mischievous innovations of modern trainers, and are the result

* In experimenting upon deaf and dumb patients I have succeeded in getting the initial attack, but the voice sunk in pitch as breath-pressure decreased, just as an infant's cry.

of a moving instrument instead of a controlling will.

To prove the subordination of the instrument to the Will, notes can be tested thus :



Eighth Law.—Full power. Muscles used are strengthened; muscles disused are weakened; muscles abused suffer from the ill-treatment. The old school studied at *full* power to strengthen enfeebled muscles, and to inform the perception of the student of the limit up to which his will could secure vocal response. A piano-tuner in tuning a piano always strikes the notes as hard as possible in order to set them, and if this were not done the instrument would speedily get out of tune; it is the absence of a similar test in modern voice-training that causes voices so soon to decay.

“Students should practise at full voice.

“Beautiful piano tones require as much *full power*, or command over the vocal instrument, for their production as do the loudest sounds” (Novello).

“Above all things, it is important to preserve the power of sustaining, without the slightest tremulousness, an equal tone.

“I knew one very excellent teacher of public singers who desired his scholars to begin with any given quantity of tone, and to preserve the same quantity throughout. His reason was that by this practice the scholar would acquire the power of

producing any desired quantity at pleasure, and there appears to be some force in the remark.

"I know that Madame Mara could dance and maintain, during the most agitated motion, a perfectly equable and uniform voicing" (Bacon).

This is the old automatic full power, not the laboured violence of modern incompetence.

"Oh ! 'tis excellent
To have a giant's strength ; but it is tyrannous
To use it like a giant."

Ninth Law.—No effort ; all effort is error. Nature says, in effect, "Put me right, trust me, and I will play for you ; distrust me or discourage me, and I will trick and disobey you."

Garcia writes : "My father (Rossini's Almaviva) often said that the beauty of the voice constituted ninety-nine hundredths of the power of a singer." This beauty is within the reach of all ; for a bad voice is another form of cripple.

The whole gist of study may be summed up thus : Hold the breath on deep inflation ; by ceasing to will to hold, Nature, not self, sets the instrument in accurate action ; let the pressure continue the sound, and by repeated use in such manner the instrument in time will become habituated to right action—a servant to our Wills instead of a tyrant crippling and frustrating our desires. It is strange that, exactly at the same time German assumption was doing its uttermost to destroy the little known in voice-training, a medical man should be making experiments in Edinburgh, which resulted in corroborating the greatest scientific discovery affecting

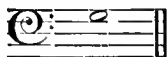
the science of voice-production that has ever been put before the public, and which discovery conclusively supports, from a scientific point of view, the teaching of the ancient school of song. This explanation of the use of the false cords and the ventricles (*vide* p. 72) gives the true solution to the right use of voice, the air in the ventricles acting somewhat analogously to the air which a trumpet-player imprisons in his cheeks; the greater reservoir, the chest, keeps the lesser ones, the ventricles, always full, and the control of measured force from the greater is dependent upon the fulness of the less, this simply owing to the distribution of nerves. No man can speak or sing with perfect self-possession and accurate response to will unless he has masterful control over the respiratory apparatus, and no man can have this control unless his organs of voice be rightly used. A corroborative proof, being the connecting link between Dr. Wyllie on the one side and Signor Garcia on the other, is found in the fact that sound can be whispered at the false cords, the air escaping in an elongated hiss, while the true cords, being open, do not vibrate. The breath under these conditions is held back in sustained escape, and is consumed in about the same time as it would be consumed were a vocal tone accompanying it. Further squeezed, the false cords produce "falsetto."

Tenth Law.—In producing the aspirate *h* our will acts in the *same* direction as the escaping air, twisting our bodily form in the direction of the

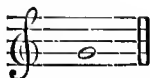
flow; the corrective to this is willing the other way, thinking downward and striking at the note from above, as it were. This act changes the internal state back to its forsaken shape, just as a drill-sergeant bends upright a stooping recruit, or just as we roll a piece of music the other way to straighten it. This enlisting of the mind to help the body considerably shortens time, and does for a student in a few months what took Cattaneo more than twelve months with me.

The best starting-point for study is the note produced without tension and without relaxation, but solely by approximation of the true cords, the true cords and the breath equalizing their respective force, for in this the conditions both of elevation and depression of pitch are not involved; the note produced from the detached larynx by imitating the action which contracts the fissure would give the easiest sound in the living subject: this, in the average adult, male or female, is middle G, and in strange corroboration we find G accepted long ago by priests as the most convenient note upon which to recite words.

MALE.



FEMALE.



Of course the "station note" is relative, not absolute, like all other conditions of an individual—comparative anatomy teaches us this—but we are arranging an average of the species.

Here it is important to the student that a popular

error should be corrected. It is generally believed that remote notes are more difficult than central ones. This is not so: all effort is error; for instance, we see to a certain distance, and to a certain nearness; within these limits all points of sight are equally easy. We hear to a certain height and to a certain depth, and within these limits all notes are equally audible. So with voice: all notes are equally easy within the full compass.

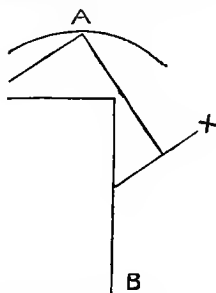
Having fixed the station note of equally sustained tone and of unflagging strength, all notes below are made by the larynx sinking and the attendant relaxation of the cords; from the detached larynx, male and female, Dr. Wyllie produced an octave below the station note; a like octave can be produced from the living subject. For the notes above G the larynx rises. As the larynx ascends in the pipe, the speed of the ascent of the front part of the cricoid is swifter than that of the thyroid; so that this part of the cricoid in its upward progress gains on the ascent of its auxiliary, the thyroid; hence the vocal cords are tightened, and the pitch of voice raised. In this ascent the thyroid and cricoid rotate on an eccentric centre, causing the planes of both false and true cords to become with each heightened tone more slanting; thus, the sound, travelling at a right angle to these planes, finds its point of impact on the arch of the palate more and more forward with each ascending sound. This physiological fact was revealed to me by the simple act of putting my finger on the thyroid and

singing a scale upwards. I proclaimed this in the *Orchestra*, 1879, and in my reprint, "Vox Populi," February, 1880, and physiologists are accepting it. Here are Sir Morell Mackenzie's words: "It used to be believed that the effect was produced by pulling the thyroid cartilage down, so as to increase the distance between it and the arytenoid cartilage behind, and thus *stretch* the vocal cord by having one of its points of attachment further away from the other. It is now known that it is the cricoid cartilage which is pulled upwards at its front part" (p. 21, second edition). Dr. F. H. Hooper, of Boston, U.S., has proved experimentally the truth of this; so another error is swept away, and with it the "low larynx" and "fixed larynx" systems of training. Professor Huxley evidently drew his conclusion from the dissecting-room, and forgot the practical test I applied in the living subject. Unfortunately he still insists he is right, and that the depression of the thyroid heightens pitch, and that the elevation of the thyroid lowers it ("Elementary Physiology," p. 183).* My discovery solves Madame Seiler's difficulty: "That the voice must be brought for-

* Since the above was written, Professor Huxley, in his last edition, writes: "If, while a low note is being sounded, the tip of the finger be placed on the crico-thyroid space (which can be felt through the skin, beneath the lower edge of the thyroid cartilage), and a high note be then suddenly produced, the crico-thyroid space will be found to be narrowed by the approximation of the front edges of the cricoid and thyroid cartilage. At the same time, however, the whole larynx is, to a slight extent, *moved bodily upwards* and thrown forward, and the cricoid has a particularly distinct *upward* movement; this movement of the *whole* larynx must be carefully distinguished from the motion of the thyroid relatively to the cricoid."—"Elementary Physiology," 1890, p. 196.

ward in the mouth is now acknowledged as necessary, and aimed at by the best teachers. But the reasons why the tones thus sound better are not known" (p. 112, Phil. ed., 1868). This forward production is what was called *fior di labbro*, or flower of lip, singing.

"The larynx ascends in the throat to the greatest height permitted by the elasticity of the windpipe" (Novello), *i.e.*, it is pushed up by pressure from below, which it resists by natural law.



B—Outline of pipe.
X—Line of fissure.
A—Point of impact on palate.

Sound can be directed like a jet of water out of a fire-engine; the use of speaking-trumpets at sea proves this. It is transmitted, like a wriggle down a rope, not projected like a thrown stone or a bullet out of a gun.*

Eleventh Law.—If we have the extreme note of a

* If we note the singers of our popular comic operas, we find those whose words can be heard have "no voice," while those who have voice do not clearly articulate words; the larynx is not sufficiently high to rightly place sound, so with uttered words it opens and the tone is deadened; but kept close by will-force, there is tone, but no words.

register, we necessarily have all those within it, just the same as if we know how far we can reach we have all the lesser distances within that circumference; or, to take another illustration, if we know how much we can lift, we can lift all lesser weights.

Low Register.—As this is a register of lateral relaxation, work upwards from B to F in semitones.



This metaphysical principle is an incalculable saving of time.

Middle Register.—As this is a register of lateral tension, work downward from C or D to F in semitones to the point of repose, the station note F or G.



I give the minimum compass safe for self-tuition. F is given as a common note capable of being produced at will in either register.

All voices have TWO FOUNDATION REGISTERS of about eight semitones each register, one register made by relaxation of cords, the other by tension of them; both of these are forward productions. All

other registers are evolved in some way or other from these, and are of necessity included in them.

Elasticity.—Bodily parts are more elastic in a dead animal when warm than when cold, they are still more elastic in a living animal than when dead. We regard the old classical compass of two octaves as the minimum compass of all voices; a natural voice has nearer three.

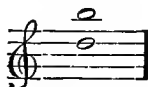
Here is pointed out the influence of second causes upon pitch, so that the student may know what difference in hue to accept as true and what to reject as false. A change in hue arising solely from change of direction has been a great source of error in our teachers, who, when speaking of "registers," have been invariably misled by this. The object Nature evidently has in directing tone is that with equally developed force vocal utterance and articulate speech can be simultaneously used without one influencing for evil the other. This affords another proof of the superiority of the fast-dying old school which insisted upon "a forward production" as a basis for song; and the reason why the larynx does not assume its right elevation for higher notes than the station note is because during our past years it has only been used *indirectly* to strengthen spoken words, so that a tendency has grown up in the larynx to assume and retain the average altitude of language and to leave the production of all notes of greater height than the average to *will-force* acting through the chest-muscles alone. Consequently most untaught persons produce sounds above the station note by too great an excess of blast, as seen

by the rapid exhaustion of air, as heard by the point where the sound strikes being far back in the mouth, and as felt by the Adam's apple being low, and finally corroborated by a feeling of personal fatigue when such notes are given forth. The corrective study for this is having recourse to a steady spring from the organ itself; this, by practice, induces a habit of rising until a position of highest elevation is fixed. Take mental aim, therefore, poising the voice, and attack D or C striking downwards to meet the air at the larynx. A curious phenomenon occurs about D or E: if the larynx ascends above this point the sound is propelled directly out of the mouth without any reflection on the arch, so that a shout or noise results.

Twelfth Law.—Forecast. Change into a higher register lower down in ascending passages; change into a lower register higher up for descending ones.

Thirteenth Law.—High register (first mode). This is a backward production, and is evolved from the register below it, the forward register of tension; it is dramatic, and *does* require balanced and resisted force, or cannot portray the passion it is intended to colour. As soon as the sound obtains *no* reflection the scale must be continued by letting the larynx *sink* and going over the preceding five notes, G to D, with greater pressure, thereby elevating them a fifth (full harmonics). The descent of the larynx about high E can be felt with the finger. All these notes above the high D are producible in more ways than one, but all depend upon a correct

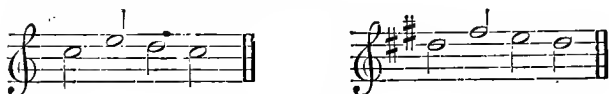
emission of the tones below, so that the old teachers were right in insisting on fixing middle and low notes, although they did not know the reason why this should be done. In *soprani sfogati*, *tenori robusti*, and in all low voices of either sex, the notes above D are full harmonics produced by increased blast acting upon the cords fixed for a fifth below. This is what the old school called *voce chiusa*, or closed notes, giving this: and an octave lower for tenors, a third lower for contraltos, a tenth lower for basses:



There is, of course, nothing closed except the parts making voice, but the *direction* of tone is different. If we imagine a straight line drawn from the tip of the nose through the larynx and out at the back we get *the direction of thought* and the upward and downward direction of vibration in the "open" register or forward production; if we imagine a straight line drawn from the back of the head through the larynx, down to where the ribs part in front, we get *the direction of thought* and the upward and downward direction of vibration of the "closed" register or backward production. I have known this metaphysical explanation set the registers in a few minutes. To induce the larynx to sink for the high notes, the old school used the vowel *u* (*oo*); but it was a *thought u*, not a mouthed

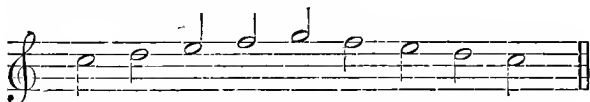
one, the pharynx being the cause of this apparent change of vowel sound.

Cattaneo's mode with me :



The notes with tails turned up show the higher register, the ones with tails turned down show the lower register.

Corsi's mode with Mr. Maas :



with same change of vowel.

Here it is necessary to give a few words of warning. To develop a muscle for one note means to strengthen it for all. To economize air for one note means to economize it for all, therefore never study for compass. If the register of dramatic reproduction be attempted before the lower ones are set it will blow sharp and the lower notes will become flat. This production is used in all dramatic song, such as "Sound an Alarm"; it has always the impression of bodily energy.

Fourteenth Law.—High register (second mode). This is evolved, but in a different manner; it is used in high passages of love, such as "Love in her Eyes" (Handel), and has always the impression of perfect ease. In "light" voices the notes above D are harmonics on a "node" from the true cords

fixed for an octave and some for a twelfth below. By emitting a deadened high note (falsetto) and pressing above the thyroid with finger and thumb, the sound will suddenly burst out in a bright, clear tone; this is the production sought for by light singers.

The first high note Cattaneo put on my voice was B, and he took it from the octave below :



Keep the position of the open (middle) note, and absolutely without any feeling or effort, think the octave above, but *think* and imagine yourself *pinching* downward. If this production will not come in this way, take the high note falsetto, then think and squeeze downwards from the false cords; the true cords will synchronize in time. In the living subject there are four series of true vocal tones: one set produced by Relaxation, one set by Tension, two sets by Reproduction; and the physical facts producing these four series are made manifest to man through created sound by four entirely natural but different hues. We know that air confined in spaces will strengthen and re-enforce sound. In a human body there are three caverns filled with air that influence tone—the chest, the pharynx, and the mouth—and that cavern which of the three exercises the preponderating influence in tingeing tone has hitherto been used to give a name to that series of sounds so tinged; thus, we have one set of

sounds termed "chest," and another "head." Moreover, with an increasing current of air from below, the sound is carried by the current in one direction, and impeded in a contrary one. As all these second causes are absent during observations on the detached parts, and as all remarks in medical works are drawn from this latter aspect of observance, we naturally find men of science writing of the "register" of voice (two octaves), whilst musicians, approaching from a different point, have confusedly brought in all second causes, and so speak of the "registers" of voice; hence the discrepancy in the statements of the two classes of men. The sudden change of hue in the female voice between middle F and G takes place just the same in the male voice, an octave lower, but owing to the difference in bodily form the resonance continues in the chest of men where it ceases in that of women; the relative sizes of male to female cords are as three to two, but the relative size of mouth is as five to four. The ignorance of these physical facts is the cause of much false teaching, and has misled all previous writers.

Further, it is assumed by voice-trainers that because there is a difference of hue between one series of sounds and another series of sounds, Nature causes a "break" in the voice, which break has to be "bridged over" (see any vocal tutor). But a difference does not necessarily involve a defect; so what is erroneously termed a "break" may with better judgment be termed a "joint." A break is a bungle of ignorance, and the use of the

term gives to airy nothings a local habitation, and a name calculated to deceive the public; the term itself is based on the assumption that Nature habitually creates man a cripple, and thus teachers proceed to destroy a natural diversity in hue under a pretext of covering an imaginary gap. The hue with which each register is coloured, and which men try to annihilate, is given by Nature for a definite purpose, and is right.

Fifteenth Law.—Differentiate the registers, but assimilate the qualities. Just as a pianist knows which hand he will use, and never confuses between one hand and the other, so is a vocalist with his registers; and just as a listener cannot tell by sound which hand is in use, so a listener should not be able to tell by sound which register is in use.* This brings us to the science of æsthetics, which science is broadly divisible into that which stimulates, which may be called Motion, and that which depresses, and which may be called Repose. Power will excite, softness will tranquillize; so with height, and the opposite, depth; and with quickness, and its opposite, slowness.

MOTION.	REPOSE.
Power. Height. Quickness.	Softness. Depth. Slowness.

* A celebrated scientist said to me once, "Oh, Mr. Lunn, you think you change when you don't." To which I answered, "No, I know when I change, but you cannot detect it." Of course the proof of a change is that in early study anyone could have detected it.

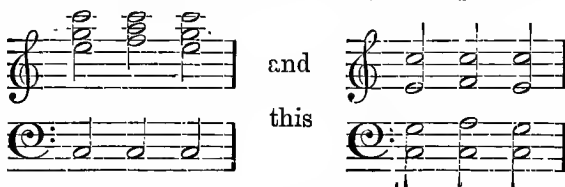
The contradictories of any one of the above terms are found in the opposites to the accompanying other two ; thus, the stimulus derived from height can be counterbalanced by slowness and softness. etc. ; but in the voice, wherever we require an outer manifestation of constant excitement, Nature has strengthened her æsthetic law by fixing a hue which expresses that mental state irrespective of the words associated therewith : and wherever we require an outer manifestation of constant repose. Nature in like manner has fixed a corresponding hue. These are immutable results arising from an affinity between the receptive faculty and the intrinsic properties of the instrument. But where all kinds of expression are shown, that is, in the ordinary colloquial compass, the tone is a negative one.*

Sixteenth Law.—All false production can be used by an artist for a purpose. The *roca cupa* or dead voice, is voice adulterated by greater escape of air—in short, bad production.

There are a number of traditions which are incommunicable by printed type ; for instance, there is a *vibrato* the exact counterpart of the “close shake” of the violin, beautiful if exceptionally applied, made by rapid alterations in pitch (not a shake) : this is never taught, and rarely heard.

* Probably this physiologico-æsthetic fact, taken in connection with Dr. Wollaston's discovery of the *susurrus* of muscle, and the additions to this by Dr. Haughton, of Dublin, and Dr. Collongue, of Paris, may give the scientific basis for the solution of the much-vexed question of “pitch.”

Seventeenth Law.—Never breathe through the nose when singing, or a habit of nasal tone will be acquired. The caverns of the nose and skull reinforce and multiply by vibration within them, as a drum or violin body; but for a moving stream of vibrating air to pass into them is to get redundant power in upper partials, and consequent loss of volume. It is the difference between this:



The richness of the one compared with the thinness of the other is apparent, and this is one cause of the tinny modern voices.

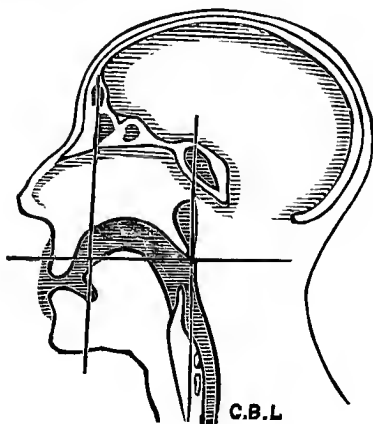
Open the mouth wide enough not to feel it is open; if the openness be felt the sound cannot get in; if the lips and teeth are not sufficiently apart the sound cannot get out.

Resonance must take place in the upper cavities, for without it sound is dull; but there must be no egress of air through them, for if there be the sound is corrupted by a twang. In other words, in perfect tone the caverns of the nose are used as resonators, but not as air-passages. There is a stationary vibrating column above the soft palate, and there is a co-existing passage of voiced air, the right egress of which is the mouth, and not the nose; and the rule of this egress is to have the greatest tone with the least escape of breath.

“The *nasal twang*, so common in untrained singers, is caused by the soft palate, which, if suffered to retain too low a position at the back of the mouth, leaves the nasal passages too much enclosed, and inclines sound to escape principally through this channel.

“If the evil be obstinate, it will be necessary to correct it by holding the nostrils entirely closed until a proper position of the mouth be obtained. The production of head notes may be facilitated, and their compass extended, by turning the column of sound in the direction of the nasal passages, through which, however, it does not escape, as may be proved by the student closing the nostrils entirely while emitting a head note, which will suffer no perceptible change in sound during the process” (Novello).

Here is a sketch of the parts :



If the perpendicular lines be made to slant to the left, the voice will be lightened; if to the right it will be weightened. Then there is the resonance in the pipes below. In the organ pipe the diameter decreases with the elevation of pitch, and thereby loses volume; but in a rightly set voice the diameter increases with elevation of pitch, consequently volume *increases*, and compass does not attract attention to itself. Bad singers make height by contraction from without; good singers make it by expansion from within.

We now assume the instrument perfect, just as a student of the piano assumes his piano perfect. Our next step is the acquisition of technique. Technique is to song what grammar is to speech. In this we should use no accompaniment, plunge into the sea of sound; it is only a cripple who wants a crutch, or a blind man a dog to lead him. Much wasted work is done by students accompanying their voice with their piano. The sheet of exercises I use* was alleged by Cattaneo to be the historical sheet used by Porpora with Caffarelli. He built up from single tones, semitones, preparations, intervals, etc. Now, there are a few things to be noted in doing exercises. English is an emphatic language in sense, but a feebly emphasized one in sound, and the English transfer their habit of speech on to their music, so sing and play *tamely*; hence the proverb, "The English are not a musical people." But the test of a people's capacity is in the percentage of those who try; the

* To be had from the Author.

success of them is seen by school or method; therefore a great percentage of feeble performers points to the conclusion of bad school in teachers, not to want of capacity in pupils. Porpora wrote all his vocal exercises on one sheet of paper, and considered *practical examples of teachers* as essential to all vocal students (Porpora's "Elements of Singing").

Eighteenth Law.—Rhythm is a periodic accent, and gives the first impression of form; increase, then, the proportion between the accented and non-accented notes. Tameness results primarily from insufficient accent. Level up the lesser accent in speech to the greater one in sound; do not level down the music to the words.

Nineteenth Law.—Either a man's lower nature rules his higher, or his higher rules his lower; if he take breath because he must, then his lower nature rules; if he breathe because he wills, then his higher nature rules. As music is the body of poetry, and that body is form, breathe at equal distances in all exercises. Much of the tedium of exercise practice is removed by enlisting the mind in the work to be done.

For further exercises take Garcia's book with the letter-press; its exercises are unapproached. Published by Romer and Co.

Testimony of Consciousness.—If we spread out our hands and place each finger top joint against the corresponding tips of the other hand the parts by mutual pressure witness each to each whether much or little pressure be used, and if they slip a

feeling of lost control is at once felt. The consciousness of resistance is only half that of an external opposing force, because it is distributed. What one hand is to the other so the restraining larynx is to the propelling muscles, and the parts can grow in equal proportion in all directions, like a distended ball.

Physiological results go to show approximation of false cords, inflation of ventricles, complete inflation, and backward push, for (1) a good singer gets, without willing, the wings of the thyroid pressed outward, so that the angular larynx disappears; (2) the ribs bulge where they divide, showing a backward push, and therefore a resistance, at the exit. And (3) there is a further economic principle here that appears hitherto to have escaped observation. The more obtuse the angle of approach to the cords—i.e., the more the backward pressure from the eddy in the ventricles—the greater the recoil. And this has its acoustical equivalent. A compressed fluid, restricted in action or in escape to special boundaries, will in time make the spaces which confine it symmetrical; and the more symmetrical a cavern multiplying sound, the more the beauty of such sound is enhanced.

It has been discovered that Galen, seventeen hundred years ago, proclaimed the same truths in natural physics as those for which I contend. He says: "But this body* of the glottis is not only

* Galen considers the "body," which he calls glottis, to consist of the vocal and ventricular bands of both sides, with the ventricles between them.

necessary to the organ of voice, but also to what is called holding the breath . . . to which action the nature of the aforesaid glottis contributes not a little, for to effect the said purpose the parts of it of the right and of the left approach, so as to fall together accurately, and close the passage. But should a small portion be left unclosed, not even this, as being unforeseen, has been disregarded by Nature, who has worked an opening on each side of the glottis, and placed in continuity with the aperture a cavity within by no means small. When, therefore, the air, making use of a wide channel, goes into the animal, and passes out again, none of it is turned aside into the cavity. When, however, the passage out is blocked, the air, being confined in a narrow space, is diverted forcibly towards the sides, and opens the mouth of the aperture of the glottis, which hitherto has been closed by the folding together of the lips. The cavities in the glottis of the larynx being thus filled with wind, it is, of course, necessary that the swelling so produced should bulge towards the passage of the breath, and shut it with exactitude, even if a small part had previously been left open” (Oribasius, I., xxiv., c. 9).

The more advanced physiologists accept my re-discovery. In *Voice*, August, 1887, there is an article by Mr. Ephraim Cutter, A.M., M.D., LL.D., of New York, from which is extracted the following: “It is worth recording as a *fact* that the false vocal cords or ventricular bands are the agents that hold in the breath, leaving the vocal cords to rest, and

to engage in work at the will of the performer." And again, he showed by laryngoscopic demonstration the "appearance of his larynx during the holding of the breath, and showing the *false* vocal cords forming a closed platform, which shuts the larynx tight enough to stop and hold the breath." "It is stated that their function (ventricles) is to ensure complete inflation of the larynx during singing. . . . The pouches are thus rendered temporary air-reservoirs" (Armand Semple, B.A., M.B., L.S.A., M.R.C.P., London).

"Disregarding, for a time, the vocal ligaments, let the aim be to ascertain the actual states of the false vocal cords during different breathing efforts, and during the emission of sounds musical or non-musical—anything, in fact, tending to determine for us what the differences in condition, what the variations in activity coincident with changes in position of other adjacent parts of the vocal apparatus. I do not intend by my suggestion to assume that the ventricles beneath the false vocal cords are inflated during phonation (of course not with him), for my studies lead me to infer that the physical action is exactly the contrary of inflation; neither would I imply that the false vocal cords are approximated in the same way and to the same degree as are the true vocal ligaments when vibrating. But that the false vocal cords do change their position in varying degrees is not, I believe, disputed; and the points to be decided are, *how much do they approximate, from what causes, and for what end?* Merkel very plainly shows that changes

do take place, that there is a position accompanying a low-pitched note, and a distinctly new position when the voice is singing in the higher range of pitch. For scientific value the investigation should be directed to ascertain specifically what the changes of this nature are when different notes are sung, and when the quality of tone is varied ; also whether the changes are manifest in similar degree when tones of like pitch are produced by different individuals " (*Medical Press*, January 16, 1884).

" The credit of pointing out this fact [control of voice by false cords], which I believe to have been verified by laryngoscopic observation, both autoscopic and otherwise, is due to Lunn " (Dr. Gordon Holmes, " *Vocal Physiology*," second edition, p. 177).

" The right use of the ventricles and false cords just makes the difference between good and bad production, between a beautiful singing note and an ugly noise. The correct action of the ventricles seems to have been known to Galen as early as the second century. The credit of rediscovering their use belongs to Mr. Lunn " (" *First Principles of Voice Production in Song and Speech*," by T. Kelly, S.J.).

Testimony of Use of False Cords.—Marcet, in a case of chronic inflammation, says : ' I believe that the complete disappearance of the true vocal cords must not be considered as an indication that the voice cannot be recovered. In a very remarkable case of tubercular laryngitis I have had under my care, the voice was recovered, notwithstanding that the closest examination of the larynx (and the

patient exhibited his throat admirably) failed to show the presence of the vocal cords. In this case the voice was entirely due to the action of the *false cords*, which had accommodated themselves to the patient's requirements, and become possessed of the power of vibrating, emitting a harsh and low, but not unpleasant, sound, which could be well heard at a distance" (p. 27). I had a pupil who could do this.

The objections to my explanation of right production are two: (1) No function has hitherto been assigned to the false cords and ventricles. I have assigned one;* it is for physiologists to assign another, or give another physical explanation. (2) It is objected the false cords are so feeble. Answer—"Atrophy." We do not draw conclusions of a blacksmith's arm from the attenuated arm of a ballet girl. (3) Oxen, and other beasts having loud voices, have neither false cords nor ventricles; but this objection tells in my favour. It is exactly because they have not these parts that their voices are unmusical, as it is the disuse of these parts in man that causes human voices to be unmusical and require training. The physical correlative to artistic voice is, therefore, as plain as A, B, C (frontispiece).

* The following extract affords a splendid and unintended corroboration:

"In the howling monkeys of America there are several pouches opening from the larynx, which seem destined to increase the volume of tone that issues from it—one of these is excavated in the hyoid bone itself. Although these monkeys are of inconsiderable size, yet their voices are louder than the roaring of lions, and are distinctly audible at the distance of two miles; and when a number of them are congregated together, the effect is terrific."—Carpenter's "Physics."

The physiological and physical principles have of late been considerably drawn out by Drs. Lauder Brunton and Theodore Cash, of St. Bartholomew's Hospital. It is shown by them that those beasts that have not false cords cannot strike out with the forelegs ; this is, of course, because they can make no movable fulcrum, owing to their inability to imprison and compress air (see *Journal of Anatomy and Physiology*, vol. xvii.).

It has been advanced that the song of birds is inspiratory ; but it is not so.* Song birds all sing on expiration ; the middle willow warbler will, perhaps, best show this to a casual observer. Thrushes have an individual as well as a specific character in their song.

* His Grace the Duke of Argyll kindly called my attention to this objection (1890), but I settled the question by noting the vapour from a robin twittering on a frosty morn.

PART III.

VOICE-TRAINING was originally the work of past great singers, who taught by imitation; for many years this work has been added as an inferior adjunct to teaching playing upon the piano, the result being that we occasionally get a half-taught singer, who is carefully exhibited at great cost on festive occasions, and caused to sing at us, while we for the most part remain a nation of mutes; thus the public have got to look upon a beautiful voice as a freak of Nature, or a beautiful monstrosity, instead of being, as it is, a common gift of God to all, implanted in each of us for solace in sorrow, enjoyment in leisure, and spur in work. The difference, then, between the present essay and the mistaken suppositions propagated in accepted vocal works is this: each of the existing works is started on the notion that the writer is great and Nature poor and small, while this work assumes man's littleness and Nature's greatness, and asserts that men are better employed in perceiving a true thing than they are in conceiving a false one; to this end the economy of Nature has been shown, the gradual

decline of tone through lost relationship has been traced, together with the introduction of spurious artificial force, and the injurious association of vital currents by use of spoken words. The modes of restoration and readjustment by decomposition of these currents and the severance of vocal tone from articulate speech have already been pointed out, going back in all simplicity to first principles as shown in child-life ; and the gradual development by steady right-directed work has been enforced. We see how conflicting opinions have arisen, and how these, and observations from different aspects, can be explained, and, while each in its way correct, made to agree, and we see how science has been retarded by voice-culture having got into the hands of a wrong set of men. Of course, a true teacher of music would realize the immense advantage that must accrue to his profession if voice-trainers had a separate sphere of action. But, instead of that, it is generally assumed that the most difficult branch of all musical training—that of guiding an invisible living instrument—is quite an easy matter, requiring no power on the part of the teacher to command any “utterance of harmony” from it himself, or any skill on his part ! Are man’s nerves and muscles easier to be played upon than tempered scales and ivory keys ? It is not so, and only because custom sanctions the fallacy is the evil obscured. The intellectual world has not as yet elevated song into a science, so that it has never been other than a matter of imitation ; but even the power on the part of a master to do and exemplify

what is demanded is not considered a requisite of modern teaching.

“The greater includes the less.” It has hitherto been assumed that song is a branch of music, instead of admitting that music is a branch of song; all that exists in that is included in this, and other things exist herein besides, while so far as voice is concerned, the science of its production embraces oratory in all its forms. Naturally, then, the threshold of art has been in great part barred by false thought on voice. A musician cannot, necessarily, train a voice because he is musical; for the diagnosis telling a state of progress in readjustment of parts producing voice is oftentimes such that a musician, trusting to impressions of pleasure alone, would reject as false the very best of progress, thwarting a student under a mistaken plea of retrogression. Again, in making, arranging or attuning an instrument, pleasurable sound is ever preceded by disagreeable noise. As in all cases of keyboarded instruments this is delegated to the fabricator, the public mind has become oblivious to the fact. If a player had to arrange blindfolded the component parts of his instrument strewn in an incongruous heap upon the floor before him, he would glean some notion of what a true trainer does. A voice-trainer should not be too musical—indeed, he need but know his notes, but he must know many things rarely, if ever, included in a musician’s education.

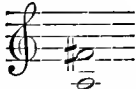
Let us test our teachers by their explanations of natural phenomena.


The following is extracted from Signor Garcia's work :

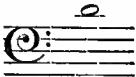
"Let us here observe that three registers of voice are generally admitted—chest, falsetto, and head. The first begins lower in a man's voice than in a woman's; *the second extends equally in both voices*; the third reaches higher in the female voice."

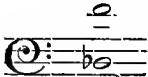
Let this be well understood: it is asserted that the male chest register necessarily has a greater number of notes in it than the female, for while this latter can never go as deep as the former, the former can extend as high as the latter; in other words, representing notes numerically, say from one to thirty, one being the lowest, a male chest register may include from one to sixteen inclusive; a female can only include from nine to sixteen: thus this part of the female voice must be eight notes less in compass than the male, and *may* be more: that is the theory held by all musicians. Taking the elaboration of this faulty theorem from Signor Garcia, we find the same error developed in detail: he gives to the contralto—the lowest female voice—a compass of from low F to the G on second

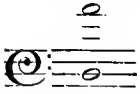
line of violin staff  to the medium—

mezzo-soprano—from low A to F sharp 

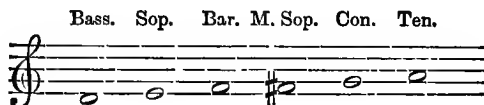
and to the highest female voice—soprano—from B to E  to male voices, bass from lowest E

to upper D  baritone from B flat to

upper F  and tenor from D to top A

 Granting Signor Gracia's statement:

“this register of the chest is the essential base of all voices;” we will place the compass given by him to each, arranged according to the highest limit given: we have bass to D, soprano to E, baritone to F, mezzo-soprano to F sharp, contralto to G, and tenor to A.



It is seen the bass ascends to D, baritone to F, tenor to A—a natural difference enough, as these voices are rightly considered a third apart in pitch; but for the female we have E for the highest voice, F sharp for the medium, and G for the lowest, so that according to this arrangement the chest register extends in altitude *transversely* to the recognised pitch of each voice. But this is not all; it will be seen that the highest note in pitch of all the notes given is ascribed to the tenor, while the soprano—the corresponding voice in the female to

the tenor in the male—has but one note above the lowest male voice. The mistake of giving such an extraordinary compass of “chest” voice to all male voices, compared with the compass given to the female, must be apparent to the most thoughtless observer.

Madame Seiler, the leading German authority, simply abstracts Garcia’s error, but goes further, drawing a hard and fast line at an absolute pitch. She gives a division in the higher part of the male voice as corresponding with a like division in the low part of the female;* but, expecting her statements ultimately to conflict with those of the medical profession, she foils the evidence of dissection thus: “But in order to render practicable the proper stretching of the excised larynx, muscles and membranes have to be cut, which *sufficiently proves* that the functions of the organ of singing in the living must be *differently* carried on.” Extend this statement and anatomy becomes valueless. In point of fact, nothing of the kind is thereby proved, but the exact opposite is suggested—namely, that the functions of the organ of singing are presumably similarly carried on, but better, more perfect, and more extended results would ensue from the living subject than are producible from the dead.

Let us turn to the metaphysical side of the question. Similar causes, in as far as they are

* The central and lower parts of all voices, adult or young of either sex, are always when at best *forward* productions; the high part of all voices, if properly produced, is a *backward* production.

similar, produce similar effects. Hence, as anatomy teaches that the constructions of the male and female larynx are similar save only in size, the results, *i.e.*, the actions and sounds resulting from them, must be similar, save only in that point which is the effect of the difference of size, *i.e.*, in the *pitch*. Therefore the female voice is an exact reproduction of the male voice, only in a higher pitch; and this has been amply proved by experiments made with the parts detached. Dr. Wyllie, in his researches, produced what may be called the *station note*—that is, the note of sole approximation of vocal cords, without tension or relaxation. By slackening tension, each larynx, male and female, could produce sounds eight notes below the station note; by increased tension and increased blast, ten pure notes above the station note were produced—that is, upwards of two octaves of full vibrations, the female extending by the same mode of production one octave above the male. If, then, in death such results can be obtained, greater, not lesser results, would of necessity be obtained from similar things in life. We may accept Signor Garcia's definition of a register as being "a series of consecutive and homogeneous sounds, rising from the grave to the acute, produced by the development of the same mechanical principle, the nature of which essentially differs from any other series of sounds equally consecutive and homogeneous, produced by another mechanical principle." It is a law in natural physics that there is no effect without a cause, and if, as alleged, the female voice be not a

reproduction of the male, there must exist a difference of construction besides that of size, which difference all anatomists in all time have on dissection failed to perceive. The *onus probandi* rests with our would-be teachers ; they assert a difference, we demand proof that such exists. But more, identity in production is denied by writers on voice, yet universal laws are deduced from one sex as affecting both. " We will study in the voice of the tenor the ascending progression of the chest register, and in the soprano, that of the falsetto and head registers " (Garcia). Then, either it is wrong to deny coincidence of production, or it is wrong to generalize the sexes ; this dilemma sufficiently shows that the inroads to science have not been deep, and that the dogmas advanced are either fallacious or premature.

Again, we are asked to believe that the "falsetto" is identical in altitude and similar in limitation, while the instruments producing these sounds differ materially in size. Finally, we are asked to believe that the power of forming a "node" (head register) is *denied* to most men, owing to an *absence* of the cuneiform cartilages. We ask the cause of these discrepancies ; it is futile to account for the errors by saying, "It is seen as explained," because we call attention to the fact that, of a number of notes of equal pitch and apparently similar production, one alone may be *accurate* and possess true musical sound by the voice, and that such note cannot be diagnosed by the laryngoscope. "Garcia says himself that one-third of the glottis was always hidden

from him by the epiglottis, and to this circumstance is the unsatisfactory character of his observations to be ascribed. But even when, after long practice, one is able at last to bring the whole glottis into view, this is not by any means enough. Not until observation has been so long continued that all the movements of the vocal organ are normal, notwithstanding the *unnatural* drawing back of the epiglottis, and not until the process that goes on is found again and again to be always the same, can it be recognised as fact" (Seiler).

To this we object; the experimenter could not possibly know, under such contortions, that the vocal organs were acting in their "normal" state; and in order to render practicable the desired observance of the instrument during the emission of sound, muscles and membranes had, by "long practice," to be distorted, which sufficiently proves that the functions of the organs of singing, when accurately emitting tone, are *differently* carried on. To observe an ugly, unmusical tone, that, being falsely produced, is readily "found to be too fatiguing," and therefrom deducing fixed laws, is about as sensible as taking a cripple to represent the human race, and deducing physical laws from his distorted state.*

* I have been experimented on many times with the laryngoscope, and had pupils examined, but the voice has never under such conditions been true to art. Here, again, is independent testimony.

Mr. Maas's testimony: "My experience is that, when required to sound my voice with the laryngoscope inserted at the back of my mouth, it is utterly impossible for me to make a vocal sound; the only utterance I can make is a noise like the baa of a sheep, or, rather, like one would imagine the sound would be in strangulation."

Mr. Santley's testimony: "Some few years ago I did try to pro-

In Mr. Arnold's work, "A Method of Teaching the Deaf and Dumb Speech, Lip-reading, and Language," the epiglottis is drawn as ruling and directing the stream of sounding air, while their teachers, to obtain some letters, press back the tongue and depress the epiglottis, hiding the voice organs. The old school regarded two octaves as the minimum compass, and got generally three. "This tonal instrument, in size about six inches by two, produces notes varying from two to three octaves" (Novello).

As in death, so in life; there are at least two octaves of full vibrations natural to all voices. These two octaves, if in the male, are usually classed under one term—"chest"; while in the female they are always classed under two, and sometimes under three terms. This confusion has arisen owing to persons mistaking reinforcement for generation; a violin-string is a generating cause, the woodwork strengthening the created sound.

This explanation accounts for the conflict between the opinions of musicians and physiologists.

Then there is the "falsetto," which does not extend equally in pitch in both voices, but extends collaterally, with the greater part of the full vibra-

duce a note while my medical man was examining my throat with a laryngoscope. I could not produce much sound, and what there was I should say was decidedly unmusical."

Mr. Sims Reeves's testimony: "My advice is, let the laryngoscope alone. Students who wish to learn to sing had better apply themselves to the art. It is my opinion that a singer should avoid looking down his own throat; too intimate a knowledge of the mechanism of the same would render him nervous and timid."

tion ; this is, as its name implies, a false production—it is created by the false cords being squeezed together, the true cords being open. The credit of discovering this is due to Dr. Illingworth.* Mr. Sims Reeves aptly described it as a sound “outside the tone.”

Then there is the harmonic, or light production, on a “node.” Weakly people, and persons of small chest-power, substitute this for about the last five notes of the full vibration, and trained artists use it for light high song. This results from skill, and not from the position of a superfluous cartilage.

The high A of Mr. Reeves and Mr. Maas, the high G of Mr. Santley, and the high B flat of Mdle. Titiens and Miss Anna Williams, are all identical in method of production ; they are called respectively male “chest” and female “head,” while the full vibrations of Mdle. Titiens and the harmonics of Madame Melba differ in production, but are classified by masters under the one term “head.”

Such errors of statement arise from a confusion between first and second causes. This is readily shown. Any difference which is observed to exist between vocal effects obtained from the larynx

* “The theory of the *falsetto* voice I wish to lay before your readers, and which, I may mention, was propounded by me in the *Edinburgh Medical Journal* for 1876, and in the *Lancet* for 1879, is, that the cavity and its upper opening are used for its production, in the same way as the mouth and lips are used in whistling, the cavity corresponding to the cavity of the mouth, and the opening between the false vocal cords to that between the approximated lips.”—*The Voice*.

when attached to the living person, and when detached after death, must be owing precisely to the difference of these two states or conditions under which the organ is examined. For we cannot admit a difference in the generating cause of the voice itself (*i.e.*, the material organ). Hence, any apparent antagonism between the hue tingeing sounds as created by the voice of a living man, and that observed in sounds produced by a living woman, must be due to *auxiliary influences* external to the mere organ of voice considered in itself. Nor is this leaving too much to be accounted for by such external influences; for there is very little difference between the sound of the male and female larynges when detached, beyond this, that the voice of the male is set several notes lower than that of the female. This absence, then, of any important distinction between the respective results of the two detached larynges is, we here contend, due solely to the fact that they *are* detached, and are cut off from the surroundings and influences of the living body.

For known reasons, the breathing of woman is pectoral, while that of man is abdominal; owing to this deeper breathing on the part of man, the whole scale of man's tones, when under full vibration, is tinged by this under-reinforcement, but this under-tone soon ceases in woman—it ceases when the larynx, by its ascent, has caused the plane of the vocal cords to assume a position so slanting that the full force of tone is thrown forward into the mouth. A female chest may be compared to

an inverted cone, a male chest to a cylinder ; the reinforcement would naturally be different under such different forms. The deeper breathing in man accounts for the first fallacy of singing-masters, and sweeps away the apparent discrepancy between the results attained by experimenters and the exemplifications presented by our songsters, and also accounts for the extraordinary assertions made by our teachers respecting the male as contrasted with the female "chest." Consequently, it may safely be asserted that the vocal cords are subject to the same natural laws as all sounding bodies, and as the sole difference between the male and female larynx is one of size alone, the voice from the latter is a reproduction of the former on a higher scale, which was to be proved.*

Madame Seiler attempts to support the fallacy held by voice-trainers thus : " As the male larynx is about a third larger than the female, it is plain that the registers in the male voice have a greater expansion." On the contrary, the expansion would be similar ; the writer evidently deduced a conclusion from excess in length, irrespective of additional breadth and thickness. The difference between the male and female larynx is uniform in all these three dimensions ; thus *greater* change of state would

* " Thus from every point of investigation we are led without halt to one definite conclusion: That the physiological action of the larynx as a sound-producing organ is identical in the male and in the female, and that whatever proportions of the vocal compass are obtained by tension or shortening of the vocal bands in the one sex are similarly gained in the other."—"The Physiology of the Vocal Registers in Male and Female experimentally considered," by Gordon Holmes : *Medical Times*, April 11, 1885.

be required of the larger larynx to produce a *similar* result to that obtained from the less. Of course a slight modification of expansion of compass might arise from some little difference in the intensity of attractive force, but this would be an individual, not a sexual difference, and might exist in cords of similar length, and one would be likely to attribute greater elasticity to members of the more delicately organized sex; this, however, is inadmissible in laying down abstract principles.

The fact that the old male soprani voices were identical in pitch and register to the female voice is another refutation of the accepted fallacy.*

The tests of a finished artist are unwavering tone, length of sound, soft high sustained passages, and powerful quickness of execution. The following cautions may help students :

- (1) Never study breathing lying down.
- (2) Never breathe through the nose when singing.
- (3) Never study aspirated singing.
- (4) Never waste breath by whispering or counting numbers before sounding the note.
- (5) Never study short notes until secure of long ones.
- (6) Never study *crescendo* and *diminuendo* until tones are fixed.
- (7) Never learn from a professor who never learned himself.
- (8) Avoid all masters whose methods have been the cause of their own failure.

* See Gordon Holmes, pp. 133, 137, first edition.

(9) Never accept an assertion unsupported by evidence.

(10) Insist on masters giving written orders as a doctor gives a prescription.

The following sciences should be studied by future trainers : (1) Metaphysics, (2) psychology, (3) natural physics, (4) acoustics. Physiology need not be studied ; it is only an oblique science bearing on vocal art. When we have a school founded on science, incontrovertible and irrefutable, then we may hope to see the great truths of the past restored, the failures of the present averted, and the Vocal Phoenix risen from its ashes will proclaim aloud with Milton :

“No voice exempt, no voice but well could join
Melodious part.”

THE END.

OPINIONS.

JOHN RUSKIN says : " I am especially glad to see the use you make of what I have been trying to teach about colour, and the extent to which you show that the same truths hold as to sound."

SIR MORELL MACKENZIE says : " A worthy representative of what I believe not only to be the best, but the *only* method of training the singing voice."

HIS GRACE THE DUKE OF ARGYLL says of the book : " It seems full of interest."

PROFESSOR BLACKIE says : " I have no hesitation in saying that the principles on which the work is based seem consistent with all the presumptions to which a sound thinker would be led."

DR. GORDON HOLMES says : " Your methods of voice-culture are practically superior to any others I am acquainted with."

The Times says : " Many apparently incontrovertible statements were presented."

The Saturday Review says : " He knows what singing ought to be, and the principles that should govern teaching."

The Wave (San Francisco) says : " Charles Lunn is a genuine discoverer and astute, practical, and suggestive thinker. His work has done most to dispel the errors, artistic and scientific, fallen into by earlier writers."

The Central Literary Paper (Leipzig) says : " It is to a considerable extent owing to Mr. Lunn that the art of voice training has of late made great progress, and commenced to become a science."

Il Mondo Artistico (Milan) says : " The illustrious lecturer is a devoted adherent to the principles of the Old Italian School. The wide observations and profound studies in the pamphlet make it a useful work for all those interested."

A
CATALOGUE OF THE PUBLICATIONS
OF
BAILLIÈRE, TINDALL, & COX,
IN
MEDICINE, SCIENCE AND ART.

CONTENTS.

	PAGE
PERIODICAL PUBLICATIONS	} <i>Back of Title</i>
DIRECTORIES 9, etc.
ANATOMY 11, etc.
ART, ARTISTIC ANATOMY, ETC. 14, etc.
CHEMISTRY 26, etc.
MEDICINE, SURGERY, AND ALLIED SCIENCES 30, etc.
PHARMACY 36, etc.
STUDENTS' AIDS SERIES 39, etc.
VETERINARY MEDICINE AND SURGERY 42
WHITE'S PHYSIOLOGICAL MANIKIN	



LONDON :
20, 21, KING WILLIAM STREET, STRAND
[PARIS AND MADRID.]
1894.

* * Baillière, Tindall, and Cox have special facilities for the disposal of authors' works in the United States and abroad; being in almost daily communication with the principal houses and agents.

PERIODICAL PUBLICATIONS.

The Medical Press and Circular. Established 1838. Published every Wednesday in London, Dublin, and Edinburgh. Price 5d. ; £1 1s. per annum, post free, in advance.

Journal of the British Dental Association. A Monthly Review of Dental Surgery. Published on the 15th of each month. Price 6d., or 7s. per annum, post free.

The Analyst. The Official Organ of "The Society of Public Analysts." Monthly, price 1s. ; 10s. 6d. per annum, paid in advance.

The Veterinary Journal, and Annals of Comparative Pathology. Monthly, price 1s. 6d. ; 18s. per annum ; Postal Union 19s. 6d., prepaid.

The Australasian Medical Gazette. Monthly, 2s., or yearly post free, price 21s.

Indian Medico-Chirurgical Review. Monthly, 1s. 6d. ; yearly subscription, 16s., post free.

Pathology. A series of illustrations of Pathological Anatomy issued in monthly parts. Each part contains 4 plates in colours, with accompanying descriptive text by PROFESSORS KAST, of Breslau, and RUMPEL, of Hamburg. The English edition revised and edited by M. ARMAND RUFFER, M.D. Oxon. Twelve parts by subscription, post free, £2 8s. Single parts, 6s. each. Single plates, 1s. 6d. each.

International Journal of Microscopy and Natural Science. Edited by Mr. ALFRED ALLEN. Price 2s. 6d. Quarterly.

Transactions of the Royal Academy of Medicine in Ireland. Annual volumes, 14s.

Foreign postage extra.

DIRECTORIES.

The Official Register of the Royal College of Veterinary Surgeons ; published in accordance with the Act of Parliament. Price 2s. 6d., post free in the United Kingdom.

Commercial Directory for Spain, her Colonies and South America, containing 500,000 Names and Addresses of the Commercial Houses, Public Officers, Offices, etc., etc. Annual, price 25s.

ALPHABETICAL INDEX OF AUTHORS.

	PAGE
ABERCROMBIE (J.) On Tetany in Young Children	15
ADAMS (W.) Surgical Treatment of Deformities	1
ALLAN (F. J.) Aids to Sanitary Science	31
ALLAN (J. H.) Tables of Doses	25
ALLEN (Alfred) Microscopical Science	27
ALLINGHAM (H. W.) Colotomy	8
ATTENDANTS. Handbook for Attendants on the Insane	24
BAKER (Benson) How to Feed an Infant	28
BALL—Nose and Pharynx	28
BANHAM—Veterinary Posological Tables	39
BANNATYNE (A.) Aids to Pathology	29
BEACH (Fletcher) Psychological Medicine	31
BERNARD (Claude) and HUETTE'S Text-book of Operative Surgery	33
BLACK (C.) Atlas of the Male Organs of Generation	10
BLACKLEY (C. H.) Hay Fever, its Causes and Treatment	22
BODDY (E. M.) History of Salt	32
————— Hydropathy	23
BORTHWICK (T.) The Demography of South Australia	16
BOWDICH (Mrs.) Confidential Chats with Mothers	15
BOWLES (R. L.) On Stertor and Apoplexy	11
BOYD (Stanley) Movable Atlas of the Foot, its Bones and Muscles	21
BRAND (A. T.) Pocket Case Book	14
BROCHARD (J.) Practical Guide for the Young Mother	28
BROWN (George) The Student's Case-book	14
————— Aids to Anatomy	9
————— Aids to Surgery	33
BROWNE (Lennox) The Throat and Nose, and their Diseases	34
————— Movable Atlases of the Throat and Ear	10
BROWNE (W. J.) The Moon, its Influence on Weather	27
BURKE—Tropical Diseases of the Horse	39
BURTON (J. E.) Translation of Ebstein's Gout	22
CAMERON (Chas.) Microbes in Fermentation, Putrefaction, and Disease ...	13
————— The Cholera Microbe and How to Meet It	15
CAMERON (Sir C. A.) History of the Royal College of Surgeons in Ireland	23
CAMPBELL (C. M.) Skin Diseases of Infancy and Early Life	32
CANTLIE (Jas.) Atlas of the Hand	10
————— Text-book of Naked-Eye Anatomy	9
CARDWELL (B.) Translation of Hygiene of Beauty	24
CASSELLS (J. Patterson) Deaf-mutism and the Education of the Deaf-mute	17
CHARCOT (J. M.) Bright's Disease of the Kidneys	25
CHRISTY (T.) Dictionary of Materia Medica	25
CHURCHILL (Fleetwood) Obstetrical and Gynæcological Nursing	28
CLARKE (J. Jackson) Cancer, Sarcoma and other Morbid Growths	14
CLARKE (Percy) Medical Laws	26
CLARKE (E. H.) The Building of a Brain	13
COFFIN (R. J. Maitland) Obstetrics	28
COLE (M. J.) Modern Microscopy	27
COOMBE (Russell) Epitome of B. P.	30
COOPER (R. T.) On Vascular Deafness	18
COSGRAVE (C. M.) Botany, Glossary of	13
COTTERELL (Ed.) The Pocket Gray, or Anatomist's Vade Mecum	9
COURTENAY (E.) Practice of Veterinary Medicine	39
COZZOLINO (V.) The Hygiene of the Ear	19
CRAWFORD (W. S.) Ulcers and their Treatment	35

	PAGE
CROOKE (G. F.) The Pathology of Tuberculosis	16
CROSS (M. J.) Modern Microscopy	27
CRUISE (F. R.) Hydropathy	23
CULLIMORE (D. H.) Consumption as a Contagious Disease	16
——— The Book of Climates	16
DARLING (W.) Anatomography, or Graphic Anatomy	9
——— The Essentials of Anatomy	9
DAWSON (W. E.) Guide to the Examinations of the Apothecaries' Society	19
DAY (W. H.) Irritable Brain in Children	13
DENNIS (Hy. J.) Second-Grade Perspective Drawing	11
——— Third-Grade Perspective Drawing	12
DESSAR (L. A.) Catarrhs and Colds	14
DOLAN (T. M.) Whooping Cough, its Pathology and Treatment.....	35
DOWSE (T. Stretch) Apoplexy	11
——— Syphilis of the Brain and Spinal Cord	34
——— Skin Diseases from Nervous Affections	32
——— The Brain and the Nerves and Influenza	13
DRAGENDORFF (Prof. G.) Plan: Analysis	15
DRYSDALE (C. R.) Nature and Treatment of Syphilis	34
DRYSDALE (John) The Protoplasmic Theory of Life.....	34
DUDGEON (R. E.) The Sphygmograph	32
DUFFEY (G. F.) Note-taking	14
EBSTEIN (Prof.) The Treatment of Gout	22
EDWARDS (F. Swinford) Urinary Surgery	35
ERSKINE (J.) Hygiene of the Ear	19
EVANS (C. W. De Lacy) How to Prolong Life? ..	18
——— Consumption: its Causes, Treatment, etc.	16
EWART (W.) Cardiac Outlines	14
——— Heart-Studies, Chiefly Clinical	22
——— How to Feel the Pulse	32
——— Symptoms and Physical Signs	14
FAU (J.) Artistic Anatomy of the Human Body	11
——— Anatomy of the External Form of Man	11
FIELD (G. P.) Diseases of the Ear	18
FINNY (F. M.) Clinical Fever Chart	21
FITZGERALD (H. P.) Dictionary of British Plants and Flowers	13
FLAXMAN (J.) Elementary Anatomical Studies for Artists	11
FLEMING (G.) Text-book of Veterinary Obstetrics.....	39
——— Neumann's Parasites of Domestic Animals	39
——— Text-book of Veterinary Surgery	39
——— Roaring in Horses	40
——— Practical Horse-Shoeing	40
——— Animal Plagues, their History, Nature and Treatment	40
——— Contagious Diseases of Animals ..	40
——— Tuberculosis.....	40
——— Human and Animal Variolæ	40
——— Heredity and Contagion in the Propagation of Tuberculosis	40
FORD—Ophthalmic Notes	20
FOTHERGILL (J. Milner) Chronic Bronchitis	13
——— The Physiological Factor in Diagnosis	17
——— Aids to Diagnosis	18
——— The Physiologist in the Household	31
——— Diseases of Sedentary and Advanced Life ..	29

	PAGE
FOTHERGILL (J. Milner) Aids to Rational Therapeutics	34
——— Vaso-Renal Changes	24
FOY (Geo.) Anæsthetics: Ancient and Modern	9
FUCHS (Dr.) The Causes and Prevention of Blindness	20
GANT (F. J.) Text-book of the Science and Practice of Surgery	33
——— Diseases of the Bladder, Prostate Gland, and Urethra	13
——— Examinations by the Conjoint Board	19
——— Students' Surgery	33
GARMANY (J. J.) Surgery on the Cadaver	33
GARROD (A. E.) Handbook of Medical Pathology	29
GEMMELL (Wm.) Dermic Memoranda	32
GIRAUD-TEULON—Anomalies of Vision	20
GLASGOW-PATTESON (R.) Skin and Hair	32
GOODALL (E.) Microscopical Examinations of the Brain	23
GORDON (Chas. A.) Our Trip to Burmah	14
——— Aids to Psychological Medicine	38
——— Life on the Gold Coast	8
——— Lessons in Military Hygiene and Surgery	23
——— A Manual of Sanitation	23
——— Rabies and Hydrophobia	23
GORDON (T. Hurd) Aids to Practical Chemistry	36
GORE (Albert A.) Our Services Under the Crown	27
——— Medical History of African Campaigns	8
GOULD—Illustrated Dictionary of Medicine, Biology, etc.	18
GOW (W. J.) Handbook of Medical Pathology	29
GREEN (F. W. Edridge) Memory	27
——— Detection of Colour Blindness	20
GREENWOOD (J.) Laws Affecting Medical Men	26
GREENWOOD (Major) Aids to Zoology	35
GRESSWELL (J. B. and A. G.) Manual of Equine Medicine and other works	40
GREVILLE (H. Leicester) Student's Hand-book of Chemistry	15
GRIFFITHS (A. B.) Micro-Organisms	12
GRIFFITHS (W. H.) Text-book of Materia Medica and Pharmacy	25
——— Notes for Pharmacopœial Preparation	30
——— Posological Tables	31
GUBB (Alfred S.) Aids to Gynæcology	22
GUILLEMARD (F. H. H.) Endemic Hæmaturia	21
HAIG-BROWN—Tonsillitis	35
HALTON (R. J.) Short Lectures on Sanitary Subjects	24
HANDBOOK for Attendants on the Insane	28
HARRIS (Vincent) Manual for the Physiological Laboratory	23
HARRIS (V. D.) Kühne's Guide to the Demonstration of Bacteria	12
HARTMANN (Prof.) On Deaf-mutism, Translation by Dr. Cassells	17
HAYNES (Stanley) Healthy Homes	24
HAZARD (W. P.) Diseases of Live Stock	41
HEIBERG (Jacob) Atlas of Cutaneous Nerve Supply	27
HEPPEL—Analytical Conic Sections	21
HERRINGHAM (W. P.) Handbook of Medical Pathology	29
HERSCHELL (Geo.) Indigestion	24
——— Heart Diagrams and Case-book	22
HEWITT (Frederic) Anæsthetics	9
HILL (J. W.) Principles and Practice of Bovine Medicine	40
——— Management and Diseases of the Dog	40
HIME (T. W.) Cholera: How to Prevent and Resist It	15
——— The Practical Guide to the Public Health Acts	31

	PAGE
HOARE—Veterinary Therapeutics	40
HOGG (Jabez) The Cure of Cataract	20
——— The Impairment of Vision from Shock	20
——— Parasitic or Germ Theory of Disease	12
HOPGOOD (T. F.) Notes on Surgical Treatment	33
HORNER (Professor) On Spectacles	20
HOWAT (G. R.) How to Prevent and Treat Consumption	16
HUNTER (Ch.) Manual for Dental Laboratory	17
HUSBAND (H. Aubrey) Handbook of Forensic Medicine	21
——— Aids to the Analysis of Food and Drugs	21
——— Handbook of the Practice of Medicine.....	26
——— Student's Pocket Prescriber	31
——— Urine	35
HUTCHINSON (Jonathan) Aids to Ophthalmic Medicine and Surgery	20
INCE (J.) Latin Grammar of Pharmacy	30
INTERNATIONAL MEDICAL CONGRESS	24
JAMES (Brindley) Replies to Questions in Therapeutics	38
JAMES (M. P.) Therapeutics of the Respiratory Passages	34
——— Vichy and its Therapeutical Resources	35
JENNINGS (C. E.) On Transfusion of the Blood and Saline Fluids	35
——— Cancer and its Complications	14
JENNINGS (Oscar) On the Cure of the Morphia Habit.....	27
JESSETT (F. B.) Surgical Diseases of Stomach and Intestines	8
——— Cancer of the Mouth and Tongue	14
——— Cancer of the Uterus.....	14
JONES (H. Macnaughton) The Diseases of Women	22
——— Subjective Noises in the Head and Ears	18
——— Hints for Midwives	28
——— and STEWART—Handbook of Diseases of the Ear and Nasopharynx.....	19
JONES (H.) Guide to Sanitary Science Exams.	32
JONES (T. Wharton) Blood in Inflammation	24
JUKES-BROWNE (A. J.) Palæontology (in Penning's Field Geology)	21
KAST AND RUMPEL—Illustrations of Pathological Anatomy	29
KEETLEY (C.R. B.) Guide to the Medical Profession.....	26
——— Surgery of Knee Joint	33
KENNEDY (Hy.) An Essay on Fatty Heart.....	22
KINGZETT—Nature's Hygiene	23
KNIGHT (G. D.) Movable Kidney	25
KUHNE—Demonstration of Bacteria	12
LAMBERT (J.) The Germ Theory of Disease	40
LEASK (J. G.) Questions at Medical Science Examinations	20
LEDWICH (J.) Anatomy of Inguinal and Femoral Regions	9
LEONARD (H.) The Pocket Anatomist	9
——— Bandaging	13
——— Hair	22
——— and CHRISTY—Dictionary of Materia Medica	25
LE SUEUR—Analytical Geometry, Straight Line and Circle	21
LETHEBY (Hy.) The Sewage Question	32
LIAUTARD (A.) Animal Castration.....	40
——— Diseases of Live Stock	41
——— Lameness of Horses	40
——— Operative Veterinary Surgery	40

	PAGE
LITHGOW (R. A. Douglas) From Generation to Generation	22
LOWNE (B. T.) Aids to Physiology	37
LUNN (C.) The Philosophy of Voice	35
——— Artistic Voice in Speech and Song	35
LUPTON (J. I.) Horses: Sound and Unsound.....	40
MACDOUGALL (A. M.) The Maybrick Case	21
MACKENZIE (Sir M.) Diseases of the Throat (in Gant's Surgery)	33
MCCAW (John) Aids to the Diagnosis and Treatment of Diseases of Children	15
MADDEN (T. More) Clinical Gynæcology	22
——— Churchill's Obstetrical Nursing	28
MADDICK (Distin) Stricture of the Urethra	33
MAGNE (Dr.) How to Preserve the Sight.....	20
MARTIN (B. R.) Diphtheria	18
MARTIN (J. W. & J.) Ambulance Work (Questions and Answers)	8
——— Nursing (Questions and Answers)	28
MASSE (J. N.) Text-book of Naked-Eye Anatomy	9
MCARDLE (J. S.) Notes on Materia Medica.	26
MCBRIDE Anatomical Outlines of the Horse	41
McLACHLAN (John) Anatomy of Surgery	33
MEARS (W. P.) Schematic Anatomy	9
MELDON (Austin) A Treatise on Gout	22
MEYRICK (J. J.) Stable Management in India.....	41
MILLARD (H. B.) Bright's Disease of the Kidneys.....	25
MILLER (B. E.) Diseases of Live Stock	41
MOLONY (M. J.) Rupture of the Perineum	32
MONIN (E.) Hygiene of Beauty	24
MOORE (E. H.) Clinical Chart for Hospital and Private Practice.....	34
MOORE (J. W.) Text Book of Eruptive and Continued Fevers.....	21
MORDHORST (Carl) Rheumatism. Its Treatment by Electric Massage ...	32
MORGAN (John) The Dangers of Chloroform and Safety of Ether	8
MORRIS (Malcolm) The Skin (in Gant's Surgery)	33
MUCKLEY (W. J.) Student's Manual of Artistic Anatomy.....	11
——— A Handbook for Painters and Art Students on the Use of Colours	16
MURRAY (R. Milne) Pregnancy.....	10
MURRELL (W.) Aids to Forensic Medicine and Toxicology	21
MUTER (J.) Key to Organic Materia Medica	25
——— Manual of Analytical Chemistry	15
NALL (S.) Aids to Obstetrics	28
NAPHEYS (G. H.) Handbook of Popular Medicine	18
——— Modern Therapeutics	34
NATIONAL SOCIETY FOR PREVENTION OF BLINDNESS	20
NEUMANN (L. G.) Treatise on Parasites and Parasitic Diseases of Domesticated Animals ..	39
NORTON (A. T.) Text-book of Operative Surgery	33
——— Osteology for Students	23
——— Affections of the Throat and Larynx	35
——— Movable Atlas of the Skeleton.....	10
——— Clinical Lectures on Recent Surgery	33
OGSTON On Unrecognised Lesions of the Labyrinth	18
ORMSBY (L. H.) Deformities of the Human Body	17
——— Phimosis and Paraphimosis	30
PALFREY (J.) Atlas of the Female Organs of Generation	18
PALMER (J. F.) How to Bring up Children by Hand	28

	PAGE
PARKE (Surgeon) Climate of Africa (in Cullimore's Book of Climates)	16
PEDDIE (M.) Manual of Physics.....	30
PENNING (W. H.) Text-book of Field Geology	21
PENNING (W. H.) Engineering Geology.....	21
——— Notes on Nuisances, Drains, and Dwellings	24
PETTENKOFER (Von) Cholera : How to Prevent and Resist It	15
PIERSOL (G. A.) Text-book of Normal Histology	23
POLITZER (Prof.) Dissections of the Human Ear	19
——— Text-Book of Diseases of the Ear	19
POWER (Hy.) Movable Atlas of the Eye, and the Mechanism of Vision	10
——— Diseases of the Eye (in Gant's Surgery)	33
POWER (D'Arcy) Handbook for the Physiological Laboratory	23
POYSER (R.) Stable Management of Troop Horses in India	41
PRATT (W.) A Physician's Sermon to Young Men	27
PROCTOR (Richd.) The Stars and the Earth	12
PSYCHOLOGICAL ASSOCIATION'S Handbook for Attendants on the Insane.....	28
PURVES (L.) Aural Diseases (in Gant's Surgery)	33
RABAGLIATI (A.) Muscular Affections which Simulate Diseases of the Pelvic Organs in Women	22
——— The Classification and Nomenclature of Diseases	18
REMSEN (Ira) Principles of Theoretical Chemistry ...	15
RENTOUL—Reform of Medical Charities	26
REYNOLDS (R. S.) The Breeding and Management of Draught Horses.....	41
RICHARDS (J. M.) A Chronology of Medicine	26
RICHARDSON (B. W.) The Healthy Manufacture of Bread	21
RIVINGTON (W.) Medical Education and Organization	26
ROBERTSON (William) A Handbook of the Practice of Equine Medicine...	41
ROCHE (J.) Hernia and Intestinal Obstruction	22
ROCHET (Chas.) The Prototype of Man, for Artists	12
ROSE (W.) Neuralgia.....	28
ROTH (W. E.) Elements of School Hygiene.....	23
——— Theatre Hygiene	23
ROUTH (C. H. F.) Overwork and Premature Mental Decay.....	29
——— On Checks to Population	31
RUFFER (Armand) Illustrations of Pathological Anatomy.....	29
SARCEY (F.) Mind your Eyes.....	20
SCHOFIELD (A. T.) Examination Cards—Pathology	20
——— Minor Surgery and Bandaging	33
SEMPLE (C. E. A.) Aids to Botany	13
——— Aids to Chemistry	14
——— Aids to Materia Medica	25
——— Aids to Medicine	26
——— Aids to Pharmacy	30
——— Diseases of Children ..	15
——— The Voice Musically and Medically Considered	35
——— The Pocket Pharmacopœia	30
SEWILL (Hy.) Manual of Dental Surgery	17
——— Dental Caries and the Prevention of Dental Caries	17
SHARMAN (J. S.) Notes on Inorganic Materia Medica.....	26
SIMON (W.) A Manual of Chemistry	15
SMITH (F. A. A.) Keep your Mouth Shut	32
SMITH (F.) Manual of Veterinary Hygiene	41
——— Manual of Veterinary Physiology	41

	PAGE
SOHN (C. E.) Dictionary of the Active Principles of Plants	15
SPARKES (John C. L.) Artistic Anatomy	11
SQUIRE (P. W.) Posological Tables	31
STARK (A. Campbell) Practical Pharmacy	20, 30
STARR (M. Allen) Brain Surgery	33
STEPHENSON (J. B.) Medicinal Remedies.....	26
STEVENS (Geo. T.) Nervous Diseases	27
STEWART (W. R. H.) Practitioner's Handbook of Diseases of the Ear.....	19
——— Aids to Otology	18
STONE (G.) Translation of Politzer's Dissections of the Human Ear	19
STRAHAN (J.) Extra-Uterine Pregnancy	28
STUDENTS' AIDS SERIES	36
SUTTON (H. G.) Lectures on Medical Pathology	29
SUTTON (Bland) Dermoids.....	17
SWEETING (R. D. R.) The Sanitation of Public Institutions	24
SYMINGTON (J.) Anatomy of the Child	9
TELLOR (L. V.) Diseases of Live Stock	41
TEULON (G.) The Functions of Vision.....	20
THIN (George) Introduction to Practical Histology	23
THOROWGOOD (J. C.) Consumption ; its Treatment by the Hypophosphites	16
——— The Treatment of Bronchial Asthma	12
——— Aids to Physical Diagnosis	18
THUDICHUM (J. L. W.) The Physiological Chemistry of the Brain	13
——— Aids to Physiological Chemistry	38
——— Aids to Public Health.....	31
——— Polypus in the Nose	31
——— The Coca of Peru, and its Remedial Principles.....	16
TICHBORNE (Professor) The Mineral Waters of Europe	27
TIDY (Meymott) and CLARKE (Percy) Medical Laws	26
TIMMS (G.) Consumption ; its Nature and Treatment	16
——— Alcohol in some Clinical Aspects, a Remedy, a Poison	8
TOMSON—Medical Electricity	19
TRANSACTIONS of Royal Academy of Medicine in Ireland	<i>Inside cover</i>
TUCKEY (C. Lloyd) Psycho-Therapeutics	24
TURNER (Dawson) Manual of Medical Electricity	19
TYSON (J.) The Urine, a Guide to its Practical Examination	35
UNDERWOOD (Arthur S.) Aids to Dental Surgery ...	17
——— Aids to Dental Histology	17
USHER (J. E.) Alcoholism	8
WAGSTAFFE (W. W.) Atlas of Cutaneous Nerve Supply	27
WALLACE (J.) Localised Peritonitis.....	29
WALSH (D.) Aids to Examinations ..	19
WALSHAM—Deformities of the Foot	21
WALSHAM and POWER—Surgical Pathology	33
WHERRY (Geo.) Clinical Notes on Nerve Disorders	27
WILLIAMS (J. W.) Aids to Biology ..	13
WILLIAMSON (J. M.) Ventnor and the Undercliff.....	16
WILLSON (A. Rivers) Chemical Notes for Pharmaceutical Students	15
WILSON (J.) A Manual of Naval Hygiene	24
WINDLE (B. C. A.) Proportions of the Human Body	12
WINSLOW (L. S. Forbes) Fasting and Feeding	20
WITKOWSKI (G. J.) Movable Atlases of the Human Body	10

AN

ALPHABETICAL INDEX OF WORKS,

IN

MEDICINE, SURGERY, SCIENCE AND ART,

PUBLISHED BY

BAILLIÈRE, TINDALL, & COX,

Abdominal Surgery. Colotomy, Inguinal, Lumbar or Transverse ; for Cancer, or Stricture with Ulceration, of the large Intestine. By HERBERT W. ALLINGHAM, F.R.C.S., Surgeon to the Great Northern Hospital, Assistant Surgeon to St. Mark's Hospital for Diseases of the Rectum, Surgical Registrar to St. George's Hospital. With six plates and numerous illustrations. Price 6s.

Abdominal Surgery. The Surgical Diseases and Injuries of the Stomach and Intestines. By F. BOWREMAN JESSETT, F.R.C.S. Eng., Surgeon to the Cancer Hospital. Copiously illustrated. Price 7s. 6d.

Africa. A Contribution to the Medical History of our West African Campaigns. By Surgeon-Major ALBERT A. GORE, M.D., Sanitary Officer on the Staff. Price 10s. 6d.

Africa. Life on the Gold Coast. A Description of the Inhabitants, their Modes and Habits of Life ; Hints to Travellers and others in Western Africa. By Surgeon-General GORDON, M.D., C.B., Hon. Physician to the Queen. Price 2s. 6d.

Alcohol, in some Clinical Aspects : A Remedy, a Poison. By GODWIN TIMMS, M.D., M.R.C.P. Lond., Senior Physician to the North London Consumption Hospital. Price 1s.

Alcoholism and its Treatment. By JOHN E. USHER, M.D., F.R.G.S. Price 3s. 6d.

"Will be found interesting and suggestive."—*The Times*.

"A very full account of the methods of treating the disease of inebriety is contained in this interesting work."—*British Medical Journal*.

Ambulance Work. Questions and Answers on "First Aid to the Injured." By JOHN W. MARTIN, M.D., and JOHN MARTIN, F.R.C.S. Twentieth thousand. Price 1s. net.

Anæsthetics. The Dangers of Chloroform and the Safety and Efficiency of Ether in Surgical Operations. By JOHN MORGAN, M.D., F.R.C.S. Second thousand, price 2s.

Anæsthetics. Selected Methods in the Administration of Nitrous Oxide and Ether. By FREDERIC HEWITT, M.A., M.D. Cantab., Lecturer on Anæsthetics at the London Hospital. Price 2s. 6d.

Anæsthetics: Ancient and Modern. Their Physiological Action, Therapeutic Use, and Mode of Action. By GEORGE FOY, F.R.C.S., Surgeon to the Richmond Hospital. Price 3s. 6d. net.

Anatomography; or, Graphic Anatomy. A new method of grasping and committing to memory the most difficult points required of the student. By W. DARLING, M.D., F.R.C.S. Eng., Professor of Anatomy in the University of New York. Price 1s.

Anatomy. Aids to Anatomy. By GEORGE BROWN, M.R.C.S., Gold Medallist, Charing Cross Hospital. Price 2s. 6d. cloth, 2s. sewn.

Anatomy. Text-Book of Naked-Eye Anatomy. With 113 Steel Plates, designed under the direction of Professor MASSE. Text by JAS. CANTLIE, M.B., C.M. (Honours), F.R.C.S., Charing Cross Hospital. Third edition. Plain, 25s., coloured, 50s., half calf.

Anatomy. The Essentials of Anatomy. A Text-book for Students and a book of easy reference to the Practitioner. By W. DARLING, M.D., F.R.C.S., and A. L. RANNEY, M.D. 12s. 6d.

Anatomy. The Pocket Gray, or Anatomist's Vade-Mecum. Compiled from the works of Gray, Ellis, Holden, and Leonard. By E. COTTERELL, F.R.C.S. Eng., late Demonstrator of Anatomy, University College, London. Fourth edition, 3s. 6d.

"A marvellous amount of information condensed into a remarkably small space."—*Med. Press.*

Anatomy. The Pocket Anatomist. By H. LEONARD, M.D. Enlarged Edition, illustrated. Price 3s. 6d.

Anatomy. Schematic Anatomy; or Diagrams, Tables and Notes treating of the Association and Systematic arrangement of Structural Details of Human Anatomy. By WILLIAM P. MEARS, M.B., Professor and Examiner in Anatomy at the University of Durham. Profusely illustrated. Price 7s. 6d.

Anatomy. Anatomy of the Child. With 14 coloured plates and 33 woodcuts. By JOHNSON SYMINGTON, M.D., F.R.S.E., F.R.C.S.E., Lecturer on Anatomy, Edinburgh. Price 42s.

Anatomy of the Inguinal and Femoral Regions in Relation to Hernia. By E. LEDWICH, Lecturer on Anatomy in the Ledwich School of Medicine, Dublin. Price 3s.

Anatomy. Human Anatomy and Physiology, illustrated by a series of Movable Atlases of the Human Body, showing the relative positions of the several parts, by means of Superposed Coloured Plates, from the designs of Professor G. J. WITKOWSKI, M.D. Each part complete in itself. Price 7s. 6d. net.

Part I.—Neck and Trunk. With Text Descriptive and Explanatory of the physiology and functions of the several parts. By ROBERT HUNTER SEMPLE, M.D., F.R.C.P. Lond. Price 7s. 6d.

The same enlarged to Life Size. Price £2 2s.

Part II.—Throat and Tongue, showing the Mechanism of Voice, Speech, and Taste. Text by LENNOX BROWNE, F.R.C.S. Ed. Price 7s. 6d.

Part III.—The Female Organs of Generation and Reproduction. Text by JAMES PALFREY, M.D., M.R.C.P. Lond., late Senior Obstetric Physician, London Hospital. Price 7s. 6d.

Part IV.—The Eye and the Apparatus of Vision. Text by HENRY POWER, F.R.C.S., Senior Ophthalmic Surgeon to St. Bartholomew's Hospital. Price 7s. 6d.

Part V.—The Ear and Teeth. The Mechanism of Hearing, and of Mastication. Text of the Ear by LENNOX BROWNE, F.R.C.S.E. The Teeth by H. SEWILL, M.R.C.S. Price 7s. 6d.

Part VI.—The Brain and Skull. (Cerebrum, Cerebellum, and Medulla Oblongata.) Text by T. STRETCH DOWSE, M.D., F.R.C.P. Ed. Price 7s. 6d.

Part VII.—The Male Organs of Generation. Text by D. CAMPBELL BLACK, M.D., Physician to the Glasgow Royal Infirmary. Price 7s. 6d.

Part VIII.—The Skeleton and its Articulations, showing the Bones and Ligaments of the Human Body and Limbs. Text by A. T. NORTON, F.R.C.S. Price 7s. 6d.

Part IX.—The Hand; its Bones, Muscles and Attachments. Text by JAS. CANTLIE, M.B., F.R.C.S. Price 7s. 6d.

Part X.—The Foot; its Bones, Muscles and Attachments. Text by STANLEY BOYD, M.B., B.S. Lond., F.R.C.S., Assistant Surgeon, Charing Cross Hospital. Price 7s. 6d.

Part XI.—Progress of Gestation. A Synopsis of Practical Obstetrics. Text by R. MILNE MURRAY, F.R.C.P. Edin., M.B. Edin. Price 7s. 6d.

The Set of Eleven Parts, complete in cloth-covered Box, with lock and key, £4 net.

* * No such simple, reliable, and comprehensive method of learning the several parts, positions, and functions of the body has hitherto been attempted; the entire Series being unique, will be most valuable to the Teacher, the Student, and to all who wish to become acquainted with the anatomy and physiology of the human economy.

Apoplexy. On Stertor, Apoplexy, and the Management of the Apoplectic State. By ROBERT L. BOWLES, M.D., F.R.C.P. Lond., Consulting Physician to the Victoria Hospital, and to the St. Andrew's Convalescent Hospital, Folkestone. With 13 Illustrations. Price 4s. 6d.

"The information is both practical and useful, and based on extensive clinical and experimental investigation. The principles advocated by the author deserve to be more widely known and acted on than they are at present."—*British Medical Journal*.

"The author has produced a book which is at present the only authority on the subject."—*Medical Press*.

Apoplexy. Diagnosis and Treatment of Apoplexy. By T. STRETCH DOWSE, M.D., F.R.C.P.E., formerly Medical Superintendent, Central London Sick Asylum. Price 1s.

Army Hygiene. Lessons in Military Hygiene and Surgery. By Surgeon-General GORDON, M.D., C.B., Hon. Physician to H.M. the Queen. Illustrated. Price 10s. 6d.

Artistic Anatomy. Anatomy of the External Forms of Man, for the use of Artists, Sculptors, etc. By Dr. J. FAU. Used at the Government School of Art, South Kensington. Twenty-nine plates. Folio. New edition. 30s. coloured, 15s. plain.

Artistic Anatomy. Elementary Anatomical Studies of the Bones and Muscles, for Students and Schools, from the drawings of J. FLAXMAN, R.A. Lately used as a Text-book in the Art Schools at South Kensington. 20 plates, with Text, price 2s.

Artistic Anatomy. The Student's Manual of Artistic Anatomy. With 25 etched plates of the bones and surface muscles of the human figure. By W. J. MUCKLEY. Used at the Government School, South Kensington. Second edition. Price 5s. 6d.

Artistic Anatomy. Elementary Artistic Anatomy of the Human Body. From the French of Dr. FAU. With English Text. Used at the Government School of Art, South Kensington. Price 5s.

Artistic Anatomy. Description of the Bones and Muscles that influence the External Form of Man. With 43 plates. By JOHN C. L. SPARKES, Principal of the National Art Training School, South Kensington. Adopted as a text-book at the Government Art Schools. Price 7s. 6d.

Artistic Drawing. Second Grade Perspective (Theory and Practice), containing 30 block illustrations, 21 plates, and many examination exercises. Used at the Government Science and Art Schools. By H. J. DENNIS, Art Master, Lambeth School of Art, Dulwich College, etc. Price 2s. 6d.

Artistic Drawing. Third Grade Perspective, for the use of Art Students. By H. J. DENNIS. Used at the Science and Art Schools. In two parts, 7s. 6d. each. Part 1, Angular and Oblique Perspective. Part 2, Shadows and Reflections; or, half-bound leather in one vol., price 15s.

Artistic Drawing. The Prototype of Man, giving the natural laws of Human proportion in both sexes. A manual for artists and professors of drawing. By CHAS. ROCHET, of Paris. Price 1s.

Artistic Drawing. A Manual of the Proportions of the Human Body for Artists. By BERTRAM C. A. WINDLE, M.A., M.D., D.Sc., Queen's Professor of Anatomy in the Mason College, Professor of Anatomy to the Royal College of Artists, and Lecturer in the Municipal School of Birmingham. Price 2s.

Artists' Colours. Their Preparation, Uses, etc. (See Colours.)

Asthma. On Asthma and Chronic Bronchitis—their Causes, Pathology and Treatment. Lettsomian Lectures. By J. C. THOROWGOOD, M.D., F.R.C.P. London, Senior Physician to the City of London Hospital for Diseases of the Chest. Fourth edition. Price 4s.

Astronomy. The Stars and the Earth; or, Thoughts on Time, Space, and Eternity. With Notes by R. A. PROCTOR, B.A. Fourteenth thousand. Price 1s.

Ataxia. Nervous Affections associated with the Initial or Curative Stage of Locomotor Ataxy. By T. STRETCH DOWSE, M.D., F.R.C.P.E. Second edition. Price 2s.

Aural Diseases. (See Ear.)

Bacteriology. Researches in Micro-Organisms, including recent Experiments in the Destruction of Microbes in Infectious Diseases, etc. By A. B. GRIFFITHS, Ph.D., F.C.S., F.R.S.E. With 52 Illustrations. Price 6s.

"An enormous amount of material, the author has taken great trouble to collect a large number of the references bearing on the points he mentions."—*Lancet*.

"The work . . . may be recommended to those who wish to have in a convenient form a very large number of facts and references relating to bacteria."—*British Medical Journal*.

Bacteriology. A Parasitic or Germ Theory of Disease: the Skin, Eye, and other affections. By JABEZ HOGG, M.R.C.S., Consulting Surgeon to the Royal Westminster Ophthalmic Hospital. Second edition. Price 2s. 6d.

Bacteriology. Guide to the Demonstration of Bacteria in the Tissues. By Dr. H. KÜHNE, of Wiesbaden. Translated and Edited by VINCENT DORMER HARRIS, M.D. Lond., F.R.C.P., Demonstrator of Physiology at St. Bartholomew's Hospital. Price 2s. 6d.

Bacteriology. Microbes in Fermentation, Putrefaction, and Disease. By CHARLES CAMERON, M.D., LL.D., M.P. Price 1s.

Professor Tyndall, F.R.S., writes: "Matthew Arnold himself could not find fault with its lucidity, while as regards knowledge and grasp of the subject I have rarely met its equal."

Bandaging. A Manual for Self-instruction. By C. H. LEONARD, A.M., M.D., Professor of Diseases of Women in the State College, Michigan. With 139 illustrations. Price 3s. 6d.

Biology. Aids to Biology. Specially prepared to meet the requirements of students reading for the first examination of the Conjoint Board. By JOSEPH W. WILLIAMS. Price 2s. sewn, and 2s. 6d. cloth.

Bladder. On Diseases of the Bladder, Prostate Gland, and Urethra. By F. J. GANT, F.R.C.S., Senior Surgeon to the Royal Free Hospital. Fifth edition. Price 12s. 6d.

Botany. A Dictionary of British Plants and Flowers; their names, pronunciation, origin, etc. By H. P. FITZGERALD. Price 2s. 6d.

Botany. Aids to Botany. Outlines of the Elementary Facts, including a Description of some of the most important Natural Orders. By C. E. ARMAND SEMPLE, B.A., M.B. Cantab., M.R.C.P. Lond. Price 2s. 6d. cloth; 2s. paper wrapper.

Botany. The Student's 'Botany. Encyclopædic Glossary. By E. MACDOWEL COSGRAVE, M.D., Lecturer on Botany, Carmichael College. Price 2s. 6d.

Brain. The Building of a Brain. By E. H. CLARKE, M.D. (author of "Sex in Education"). Price 5s.

"Carefully and elegantly written, and full of sound physiology."—*Lancet*.

Brain. On Irritable Brain in Children. By W. H. DAY, M.D., M.R.C.P. Lond., Physician to the Samaritan Hospital for Women and Children. Price 1s. 6d.

Brain. The Physiological and Chemical Constitution of the Brain, based throughout on original researches. By J. L. W. THUDICHUM, M.D., F.R.C.P. Lond. Price 10s. 6d.

Brain. On Brain and Nerve Exhaustion (Neurasthenia), and on the Exhaustions of Influenza. By the same Author. Price

Brain: examination of. (See Histology.)

Brain: Surgery of. (See Surgery.)

Bronchitis. Chronic Bronchitis: its Forms and Treatment. By J. MILNER FOTHERGILL, M.D. Ed., M.R.C.P. Lond. Second edition. Price 4s. 6d.

"It bristles with valuable hints for treatment."—*British Medical Journal*.

"The pages teem with suggestions of value."—*Philadelphia Medical Times*.

Burmah. Our Trip to Burmah, with Notes on the Ethnology, Geography, Botany, Habits and Customs of that Country, by Surgeon-General GORDON, C.B., M.D., Physician to the Queen. Illustrated with numerous Photographs, Maps, Coloured Plates, and Sketches in gold by native Artists. Price 21s.

"We lay down this book, impressed with its many beauties, its amusing sketches and anecdotes, and its useful and instructive information."—*The Times*.

Cancer and its Complications. Its Local Origin, Preventive and Curative Treatment. By C. E. JENNINGS, F.R.C.S. Eng., M.S., M.B. Second edition. Price 3s. 6d. net.

Cancer of the Mouth, Tongue and Œsophagus. By F. BOWREMAN JESSETT, F.R.C.S. Eng., Surgeon to the Cancer Hospital. 6s.

Lectures on Cancer of the Uterus, with cases. By the same Author. Price 3s. 6d.

Cancer, Sarcoma, and other Morbid Growths considered in relation to the Sporozoa. By J. JACKSON CLARKE, M.B. Lond., F.R.C.S., Curator of the Museum, and Pathologist at St. Mary's Hospital. Illustrated. Price 3s. 6d. net.

Case Books. A Pocket Case-book for Practitioners and Students. With diagrams, charts, and suggestions for note-taking. By ALEX. THEODORE BRAND, M.D., C.M. Bound in limp leather cover. Price 4s. Loose sheets per doz. 1s., 50 3s. 6d., 100 6s.

Case Taking. Cardiac Outlines for Clinical Clerks and Practitioners; and First Principles in the Physical Examination of the Heart. By W. EWART, M.D., F.R.C.P. Lond., Physician to St. George's Hospital, London. With fifty illustrations. Price 5s. 6d.

* * A supply of thoracic and cardiac outlines ($4\frac{1}{2}$ by $3\frac{3}{4}$ inches), on gummed paper, is included in each copy.

Case Taking. Symptoms and Physical Signs, a formulary for medical note-taking, with examples. By the same Author. Price 2s.

Case Books. Student's Case-book. For recording cases as seen, with full instructions for methodizing clinical study. By GEORGE BROWN, M.R.C.S., Gold Medallist, Charing Cross Hospital. Fourth thousand, cloth. Price 1s. net.

Case-book. Suggestions for a plan of taking notes in medical cases. By GEO. F. DUFFEY, M.D. Dublin. Price 6d.

Catarrhs. Home Treatment for Catarrhs and Colds. By LEONARD A. DESSAR, M.D. Illustrated. Price 5s.

Chemistry. Aids to Chemistry. By C. E. ARMAND SEMPLE, B.A., M.B. Cantab., M.R.C.P. Lond.

Part I.—Inorganic. The Non-metallic Elements. Price 2s. 6d. cloth; 2s. paper wrapper.

Part II.—Inorganic. The Metals. Price 2s. 6d. cloth; 2s. paper.

Part III.—Organic. Cloth, 2s. 6d.; paper, 2s.

Part IV.—Tablets of Chemical Analysis. Price 1s. 6d. and 1s.

"Students preparing for Matriculation at the London University, and other Examinations will find it simply invaluable."—*Students' Journal*.

- Chemistry.** A Manual of Chemistry ; a complete guide to Lectures and Laboratory work for beginners in Chemistry, and a textbook for students in Medicine and Pharmacy. By W. SIMON, Ph.D., M.D. Coloured plates, 56 Chemical reactions. 15s.
- Chemistry.** Dictionary of the Active Principles of Plants: Alkaloids, Bitter Principles, Glucosides, with tabular summary and classification of Reactions. By CHARLES E. SOHN, F.I.C., F.C.S. An entirely original book. Price 10s. 6d.
- Chemistry.** Plant Analysis, Quantitative and Qualitative. By G. DRAGENDORFF, Professor of Chemistry and Pharmacy in the University of Dorpat. Price 7s. 6d.
- Chemistry.** The Principles of Theoretical Chemistry, with special reference to the Constitution of Chemical Compounds. By IRA REMSEN, M.D., Ph.D., Professor of Chemistry in the John Hopkins University. 4th edit., enlarged and revised. 7s. 6d.
- Chemistry.** The Student's Hand-book, with Tables and Chemical Calculations. By H. LEICESTER GREVILLE, F.I.C., F.C.S. Second edition. Price 6s.
- Chemistry.** Chemical Notes for Pharmaceutical Students. By A. RIVERS WILLSON. Second edition. Price 3s. 6d.
"Of exceeding value to students going up for examination."—*Pharmaceutical Journal*.
- Chemistry.** A Short Manual of Analytical Chemistry for Laboratory Use. By JOHN MUTER, Ph.D., M.A., F.C.S. Second edition. Price 6s. 6d.
- Children.** The Diseases of Children: their History, Causes and Treatment. By C. E. ARMAND SEMPLE, B.A., M.B. Cantab., M.R.C.P. Lond. Price 6s.
- Children.** Aids to the Diagnosis and Treatment of Diseases of Children. By JOHN MCCAW, M.D., L.R.C.P. Price 3s. 6d. cloth ; 3s. paper cover.
- Children.** Confidential Chats with Mothers on the healthy rearing of Children. By Mrs. BOWDICH. Price 2s.
- Children.** On Tetany in Young Children. By J. ABERCROMBIE, M.D., M.R.C.P. Lond. Price 2s.
- Cholera:** How to Prevent and Resist it. By Professor VON PETTENKOFER and T. WHITESIDE HIME, A.B., M.B. Second edition. Illustrated. Price 3s. 6d.
- Cholera.** The Cholera Microbe and How to Meet It. Read at the Congress of the British Medical Association. By CHARLES CAMERON, M.D., LL.D., M.P. Price 1s.

Climatology. Ventnor and the Undercliff. By J. M. WILLIAMSON, M.D., M.B. Ed., Hon. Surgeon to the National Hospital for Consumption. Second edition, price 1s.

Climatology. The Demography of South Australia. By THOS. BORTHWICK, M.D. Ed., Medical Officer of Health for South Australian District. With three plates. Price 2s. 6d.

Climatology. The Book of Climates in all Lands. A Handbook for Travellers, Invalids, and others in search of Health and Recreation. By D. H. CULLIMORE, M.D., M.R.C.P. Lond. With a chapter on the Climate of Africa by Surgeon PARKE, D.C.L. Second edition, price 4s. 6d.

"A very useful book."—*The Graphic*.

"There is much which entitles it to a large circulation."—*Westminster Review*.

"A work of supreme interest to the traveller in search of health."—*Freeman's Journal*.

Coca. The Coca of Peru, its Remedial Principles, and Healing Powers. By J. L. W. THUDICHUM, M.D., F.R.C.P. Price 1s.

Colours. A Hand-book for Painters and Art Students, on the use of Colours, Vehicles, etc. By W. J. MUCKLEY. Fourth edition enlarged. Price 4s.

Consumption. Consumption as a Contagious Disease; the Merits of the Air of Mountains and Plains. By D. H. CULLIMORE, M.D., M.R.C.P. Lond., formerly H.M. Indian Army. Price 5s.

Consumption. Consumption and its Treatment by the Hypophosphites. By JOHN C. THOROWGOOD, M.D., F.R.C.P. Lond., Physician to the City of London Hospital for Diseases of the Chest, Victoria Park. Third edition, price 2s. 6d.

Consumption. A Re-investigation of its Causes. By C. W. DE LACY EVANS, M.R.C.S. Eng. Price 2s. 6d.

Consumption. How to Prevent and Treat Consumption. By G. RUTLAND HOWAT, B.A. Lond. Price 2s. 6d.

Consumption. An Essay on Consumption: Its True Nature and Successful Treatment. By GODWIN W. TIMMS, M.D. Lond. Second edition, revised and enlarged, price 10s. 6d.

Consumption. Tuberculosis from a Sanitary and Pathological Point of View. By G. FLEMING, C.B., F.R.C.V.S., President of the Royal College of Veterinary Surgeons. Price 1s.

Consumption. The Pathology of Tuberculosis (Pulmonary Tuberculosis and Tubercular Phthisis). Post Graduate Lectures delivered at Queen's Hospital, Birmingham, 1891. By GEO. F. CROOKE, M.D., Physician and Pathologist to Queen's Hospital, and Lecturer on Pathology in Queen's College. Price 2s. 6d.

Deaf-mutism. On the Education of Deaf-mutes by Lip-Reading and Articulation. By Professor HARTMANN. Translated by Dr. PATTERSON CASSELLS. Price 7s. 6d.

"The instruction of deaf-mutes is here rendered easy."—*Athenæum*.

"We can honestly recommend it to anyone seeking for knowledge."—*The Lancet*.

Deafness. (See Ear.)

Deformities. The Nature and Treatment of Deformities of the Human Body. By LAMBERT H. ORMSBY, M.B. Dub., Surgeon to the Meath Hospital and Dublin Infirmary. Price 5s.

Deformities. The Surgical Treatment of Deformities. By WM. ADAMS, F.R.C.S. Price 2s. 6d.

Deformities. Three Lectures on the Growth Rates of the Body, and Especially of the Limbs, in their Relation to the Processes of Rectification of Deformity. By WALTER PYE, F.R.C.S. Eng. Price 1s.

Dental Surgery. A Manual of Dental Surgery : Including Special Anatomy and Pathology. For Students and Practitioners. By HENRY SEWILL, M.R.C.S., L.D.S. Eng. Third edition, with upwards of 200 illustrations, chiefly original. Price 10s. 6d.

Dental. Dental Caries and the Prevention of Dental Caries. By HENRY SEWILL, M.R.C.S., L.D.S. Second edition. Price 2s. 6d.

Dental. Aids to Dental Surgery. By ARTHUR S. UNDERWOOD, M.R.C.S., L.D.S. Eng. Price 2s. 6d. cloth ; 2s. paper.

Dental. Aids to Dental Histology. By the same Author. Price 2s. 6d. cloth ; 2s. paper wrapper.

Dental. Manual for the Dental Laboratory. A Practical Guide to its Management, Economy, and Methods of Manipulation. By CHARLES HUNTER, Author of "A Treatise on Mechanical Dentistry." Price 5s.

Dermatology. (See Skin.)

Dermoids. A Course of Lectures delivered at the Royal College of Surgeons, 1889, on "Evolution in Pathology." By J. BLAND SUTTON, F.R.C.S., Hunterian Professor. Illustrated. Price 3s.

"We commend the study of this book to all interested in the elucidation of pathological problems."—*The Lancet*.

Diagnosis. The Physiological Factor in Diagnosis. By J. MILNER FOTHERGILL, M.D., M.R.C.P. Lond. Second ed. Price 7s. 6d.

"An exceedingly clever and well-written book, put together in a very plain, practical, and taking way."—*Edinburgh Medical Journal*.

- Diagnosis, Aids to.** Three Parts. Price 1s. and 1s. 6d. each.
 Part I.—Semeiological. By J. MILNER FOTHERGILL, M.D.
 Part II.—Physical. By J. C. THOROWGOOD, M.D., F.R.C.P.
 Part III.—What to Ask the Patient. By J. MILNER FOTHERGILL, M.D.
 The three parts in 1 vol. Edited by Dr. THOROWGOOD.
 Price 3s. 6d. cloth.
 "A mine of valuable information."—*Edinburgh Medical Journal.*
- Dictionary.** Illustrated Dictionary of Medicine, Biology, and Allied Sciences, including Pronunciation, Derivation. By GEORGE M. GOULD, A.M., M.D. Half morocco. Price 40s. net.
- Diphtheria.** A Practical Treatise on Diphtheria and its successful Treatment. By B. R. MARTIN, M.B. Dub. Price 1s. 6d.
- Diseases.** The Classification and Nomenclature of Diseases. By A. RABAGLIATI, M.A., M.D., Senior Surgeon Bradford Infirmary, Surgeon to the Children's Hospital. Price 2s. 6d.
- Domestic Medicine.** Handbook of Popular Medicine for family instruction, colonists and others out of reach of medical aid. By G. H. NAPHEYS, A.M., M.D. With movable plate and 100 illustrations. Price 7s. 6d.
- Diet.** How to Prolong Life. Showing the Diet and Agents best adapted for a lengthened prolongation of existence. By C. W. DE LACY EVANS, M.R.C.S. Second edition. Price 5s.
 (See also Food.)
- Ear.** Diseases of the Ear. By GEORGE P. FIELD, M.R.C.S., Aural Surgeon to St. Mary's Hospital, and Lecturer on Aural Surgery. Fifth edition, enlarged, with 23 coloured plates and numerous woodcuts. Price 12s. 6d.
- Ear.** The Pathology and Treatment of Suppurative Diseases of the Ear. By the same author. Price 2s. 6d.
- Ear.** On Unrecognised Lesions of the Labyrinth. The Cavendish Lecture, 1890. By ALEX OGDON, M.D., C.M., Regius Professor of Surgery, University of Aberdeen. Illustrated. Price 1s.
- Ear.** On Vascular Deafness. By ROBERT J. COOPER, M.D., Trinity College, Dublin. Price 3s. 6d.
- Ear.** Aids to Otology. By W. R. H. STEWART, F.R.C.S.E. Price 2s. 6d. cloth.
- Ear.** Subjective Noises in the Head and Ears. Their Etiology, Diagnosis and Treatment. By H. MACNAUGHTON JONES, M.D., F.R.C.S. I. and E., Fellow of the Medical, Obstetrical, Gynæcological and Ophthalmological Societies of London. Profusely illustrated, price 4s. 6d.

Ear. The Hygiene of the Ear. By CAVALIERE VINCENZO COZZOLINO, Professor in the Royal University of Naples, and Director of the Hospital Clinic for Diseases of the Ear, Nose, and Throat. Translated from the fifth Italian edition by James Erskine, M.A., M.B. Price 1s.

Ear. Practitioner's Hand Book of Diseases of the Ear and Nasopharynx. By Dr. H. MACNAUGHTON JONES and Mr. W. R. H. STEWART, F.R.C.S.E. Fifth edition, with plates and numerous woodcuts. Price 10s. 6d.

Ear. Text-book of Diseases of the Ear and Adjacent Organs. By PROFESSOR POLITZER, of Vienna. Translated from the third German edition by OSCAR DODD, M.D., and Edited by SIR WM. DALBY, B.A., M.B., F.R.C.S. Profusely illustrated. Price 21s.

Ear. The Anatomical and Histological Dissection of the Human Ear, in its Normal and Diseased Conditions. By Professor POLITZER, of Vienna. Translated at the author's request by GEORGE STONE, F.R.C.P. Ed. Profusely illustrated. 10s. 6d.

Electricity. A Manual of Practical Medical Electricity. By DAWSON TURNER, B.A., M.D., F.R.C.P. Ed., M.R.C.P. Lond. Profusely illustrated. Price 7s. 6d.

"Valuable alike to students and practitioners."—*Practitioner*.

"We cordially recommend this text-book, both to the student and the practitioner, as a thoroughly reliable and practical manual of the subject which it professes to teach."—*Medical Press and Circular*.

"Dr. Turner gives us an admirable and complete exposition of electricity, as applied to the practice of medicine and surgery, which is well up to date, and conveyed in a clear and lucid manner, such as will readily attract the attention of practitioners and students, for whom the book is intended."—*Medical Reprints*.

Electricity. Electricity in General Practice. By W. BOLTON TOMSON, M.D. Price 2s. 6d.

Etiquette. A few Rules of Medical Etiquette. By a L.R.C.P. Lond. Price 1s.

Examinations. Aids to Examinations. By D. WALSH, M.B., C.M., L.R.C.P. Being Questions and Answers on Materia Medica, Medicine, Midwifery, Pathology, and Forensic Medicine. New edition. Price 2s. 6d. cloth; 2s. paper wrapper.

Examinations. A Guide to the Examinations of the conjoint Board in England and for the Fellowship of the College of Surgeons, with Examination Papers. By F. J. GANT, F.R.C.S. Sixth edition, revised and enlarged. Price 5s. net.

Examinations. A Guide to the Examinations of the Apothecaries' Society of London with Questions, Tables on Materia Medica, etc. By W. E. DAWSON, L.S.A. Second edition. Price 2s. 6d.

"May be studied with great advantage by a student, shortly before presenting himself for examination."—*British Medical Journal*.

Examinations. Examination Questions on the Medical Sciences, including the Army, Navy and University Examinations. Selected and arranged by JAMES GREIG LEASK, M.B. Abdn. Second edition. Price 2s. 6d.

"Dr. Leask's questions are particularly suitable for pure examination study. Students should test themselves thereby."—*British Medical Journal*.

Examinations. Practical Pharmacy for Medical Students; specially adapted for the Examination in Practical Pharmacy of the Conjoint Board. By A. CAMPBELL STARK, Demonstrator on Materia Medica and Pharmacy at St. George's Hospital. Price 3s. 6d., or interleaved for note-taking, 4s. 6d.

Examination Cards: Questions and Answers. By A. T. SCHOFFIELD, M.D. Pathology, 2 sets, 9d. each, net. Minor Surgery, Bandaging, etc., 9d., net.

Eye. Aids to Ophthalmic Medicine and Surgery. By J. HUTCHINSON, jun., F.R.C.S., Ophthalmic Surgeon to the Great Northern Hospital. Cloth, 2s. 6d.

Eye. Ophthalmic Notes. A Pocket Guide to the Nature and Treatment of Common Affections of the Eye. By A. VERNON FORD, M.R.C.S. Eng., L.K.Q.C.P. Ire. Price 2s. 6d.

Eye. The Detection of Colour Blindness, from a practical point of view. By F. W. EDRIDGE-GREEN, M.D., F.G.S., Author of "Memory," etc., etc. Price 1s.

Eye. The Cure of Cataract and other Eye Affections. By JABEZ HOGG, M.R.C.S., Consulting Surgeon to the Royal Westminster Ophthalmic Hospital. Third edition. Price 2s. 6d.

Eye. On Impairment or Loss of Vision from Spinal Concussion or Shock. By the same Author. Price 1s. 6d.

Eye. The Functions of Vision and its Anomalies. By Dr. GIRAUD TEULON. Translated by LLOYD OWEN, F.R.C.S.I., Surgeon to the Midland Eye Hospital, Ophthalmic Surgeon to the Hospital for Sick Children, Birmingham. Price 5s.

Eye. Movable Atlas of the Eye and the Mechanism of Vision. By Prof. G. J. WITKOWSKI. Price 7s. 6d. (See Anatomy.)

(The following four works have been translated for the National Society for the Prevention and Cure of Blindness.)

Mind your Eyes. By F. SARCEY. Price 2s. 6d.

The Causes and Prevention of Blindness. By Professor FUCHS, University of Liège. Price 7s. 6d.

How to Preserve the Sight. By Dr. MAGNÉ. Price 6d.

On Spectacles, their History and Uses. By Prof. HORNER. Price 6d.

Fasting and Feeding, Psychologically considered. By L. S. FORBES WINSLOW, M.B. Cantab., D.C.L. Oxon. Price 2s.

Fever. On the Endemic Hæmaturia of Hot Climates, caused by the presence of Bilharzia Hæmaturia. By F. H. H. GUILLEMARD, M.A., M.D., F.R.G.S. Price 2s.

Fever. Text-Book of the Eruptive and Continued Fevers. By JOHN WILLIAM MOORE, B.A., M.D., M. Ch. Univ. Dub., F.R.C.P.I., Joint Professor of Practice of Medicine in the Schools of Surgery of the Royal College of Surgeons in Ireland, Physician to the Meath Hospital, Dublin, Consulting Physician to Cork Street Fever Hospital, Dublin, ex-Scholar and Diplomate in State Medicine of Trinity College, Dublin. Price 15s.

Fever Charts. Daily Clinical Fever Charts, to record the progress of a case of fever. By F. MAGEE FINNY, M.D. Price 5s.

Food. Aids to the Analysis of Food and Drugs. By H. AUBREY HUSBAND, M.B., F.R.C.S., Lecturer on Public Health in the Edinburgh Medical School. Price 1s. 6d. cloth; 1s. paper.

Food. The Healthy Manufacture of Bread. By B. W. RICHARDSON, M.D., F.R.S. Price 6d. paper cover; cloth, 1s., with Vignette.

Foot. Movable Atlas of the Foot; its Bones, Muscles, etc. By Prof. WITKOWSKI. Price 7s. 6d. (See Anatomy.)

Foot. Deformities of the Foot. By W. J. WALSHAM, M.B., F.R.C.S. Eng., Surgeon to St. Thomas's Hospital. Profusely illustrated. [In the Press.]

Forensic Medicine. The Maybrick Case. A Treatise by A. M. MACDOUGALL, B.A., LL.D. Price 10s. 6d.

Forensic Medicine. The Student's Handbook of Forensic Medicine and Public Health. By H. AUBREY HUSBAND, M.B., F.R.C.S.E. Sixth edition. Price 10s. 6d.

Forensic Medicine. Aids to Forensic Medicine and Toxicology. By WM. MURRELL, M.D., F.R.C.P. Lond., Physician to, and Lecturer on Materia Medica, Westminster Hospital. Sixth thousand. Price 2s. 6d.

Geology. Field Geology, with a Section on Palæontology. By W. HY. PENNING, F.G.S., of H.M. Geological Survey, and A. J. JUKES-BROWNE, B.A., F.G.S. With woodcuts and coloured map. Second edition, revised and enlarged. Price 7s. 6d.

"Others have taught us the principles of the science, but Mr. Penning, as an accomplished field-geologist, introduces us to the practice."—*The Academy*.

Geology. Engineering Geology. By the same Author. Illustrated with coloured maps and woodcuts. Price 3s. 6d.

"A full and lucid description of surveying and mapping, the diagnosing of the various minerals met with, the value of sites, rocks, etc."—*Popular Science Review*.

Geometry. Aids to Analytical Geometry. I. The Straight Line and Circle. By A. LE SUEUR, B.A. Cantab. Second edition, 2s.

II. The Conic Sections, with solutions of questions set at the London University and other Examinations by GEORGE HEPPEL, M.A. Cantab. Price 2s.

- Gout.** A Treatise on Gout. By AUSTIN MELDON, M.K.Q.C.P., F.R.C.S.I., Senior Surgeon Jervis Street Hospital, Consulting Physician Dublin General Infirmary. Tenth edition. Price 2s. 6d.
- Gout.** The Nature and Treatment of Gout. By Professor EBSTEIN of Gottingen University. Translated by J. E. BURTON, L.R.C.P. Lond. Price 3s. 6d.
- Gynæcology.** The Diseases of Women and their Treatment. By H. MACNAUGHTON JONES, M.D., F.R.C.S.I., F.R.C.S.E., Examiner in Midwifery, Royal College of Surgeons, Ireland. Sixth edition. Illustrated, price 12s. 6d.
- "A storehouse of information."—*The Lancet*.
- "The work of a mature and experienced authority."—*British Medical Journal*.
- "Of exceptional merit drawn from a field of wide personal experience."—*Medical Press*.
- Gynæcology.** Clinical Gynæcology: being a Handbook of Diseases peculiar to Women. By THOS. MORE MADDEN, M.D., F.R.C.S. Ed., Obstetric Physician and Gynæcologist, Mater Misericordiæ Hospital, Dublin. Price 12s. 6d.
- Gynæcology.** Aids to Gynæcology. By ALFRED S. GUBB, M.D. Paris, M.R.C.S., L.R.C.P., D.P.H., Obstetric Assistant and Gold Medallist Westminster Hospital. Second edition, enlarged. Cloth, 2s. 6d., and 2s. sewn.
- Gynæcology.** Muscular Affections which Simulate Diseases of the Pelvic Organs in Women, and their Treatment. By A. C. F. RABAGLIATI, M.A., M.D., F.R.C.S. [*In the Press*].
- Hair.** The Hair: its Growth, Care, Diseases, and Treatment. By C. H. LEONARD, A.M., M.D. Illustrated, price 7s. 6d.
- Hair.** A Synopsis of Diseases of the Skin and Hair. By R. GLASGOW-PATTERSON, M.B., Surgeon to St. Vincent's Hospital. Price 1s.
- Hand.** Movable Atlas of the Hand; its Bones, Muscles and Attachments. By Prof. WITKOWSKI. Price 7s. 6d. (See Anatomy.)
- Hay Fever:** its Causes, Treatment, and Effective Prevention; Experimental Researches. By CHAS. HARRISON BLACKLEY, M.D. Second edition, revised and enlarged. Price 10s. 6d.
- Heart.** Heart-Studies, Chiefly Clinical. By WM. EWART, M.D. Cantab., F.R.C.P., Physician to St. George's Hospital; Examiner in Medicine at the Royal College of Physicians.
- I.—The Pulse-Sensations. A Study in Tactile Sphygmology. Price 15s.
- Heart.** An Essay on Fatty Heart. By HENRY KENNEDY, A.B., M.B. Physician to the Whitworth Hospitals. Price 3s. 6d.
- Heart.** Clinical Diagrams, with Directions for Recording Cases of Heart Disease. By GEO. HERSHELL, M.D. Lond. Price 1s.
- Heredity and Disease.** From Generation to Generation. By DOUGLAS LITHGOW, LL.D., M.R.C.P. Lond. Price 4s. 6d.
- Hernia and Intestinal Obstruction.** By J. ROCHE, M.D. 6d.

Histology. Manual for the Physiological Laboratory. By VINCENT D. HARRIS, M.D., F.R.C.P., Examiner in Physiology, the Royal College of Physicians of London, and D'ARCY POWER, M.B. Oxon., Examiner, St. Bartholomew's Hospital. Fifth edition. Price 7s. 6d.

"This manual is already well and favourably known, and the new edition contains many valuable additions."—*Lancet*.

Histology. Introduction to Practical Histology. By GEORGE THIN, M.D. Price 5s.

Histology. Text-book of Normal Histology : including an Account of the Development of the Tissues and of the Organs. By GEO. A. PIERSOL, M.D., Professor of Anatomy in the University of Pennsylvania. Price 15s.

Histology. The Microscopical Examinations of the Human Brain ; Methods of Research, etc. By EDWIN GOODALL, M.D. Lond., Pathologist to the West Riding Asylum. Price 5s.

History of the Royal College of Surgeons in Ireland. By Sir C. A. CAMERON. Price 10s. 6d.

Hydrophobia. Inoculation for Rabies and Hydrophobia. A Study of the Literature of the subject. By Surgeon-General C. A. GORDON, C.B. Price 2s. 6d.

Hydrophobia. Comments on the Reports of the Committee on M. Pasteur's Treatment. By Surgeon-General C. A. GORDON, M.D., C.B. Price 2s. 6d.

Hydropathy, or the Practical Use of Cold Water. By E. MARLETT BODDY, F.R.C.S., F.S.S., L.R.C.P. Price 1s.

Hydropathy. Notes of Visits to Contrexéville and Royat-les-Bains. By F. R. CRUISE, M.D. Price 6d.

Hydropathy. Vichy and its Therapeutical Resources. By PROSSER JAMES, M.D., M.R.C.P. Lond., Lecturer on Materia Medica and Therapeutics at the London Hospital. Price 2s. 6d.

Hygiene. Lessons in Military Hygiene and Surgery, from the Franco-Prussian War. Prepared on behalf of Her Majesty's Government By Surgeon-General GORDON, M.D., C.B., Hon. Physician to the Queen. Illustrated, price 10s. 6d.

Hygiene. A Manual of Sanitation ; or, First Help in Sickness and when Wounded. Alphabetically arranged. By the same Author. Cloth, 2s. 6d. ; sewn, 1s.

"A most useful and practical manual, and should be placed in the hands of officers and men alike."—*The Graphic*.

Hygiene. Nature's Hygiene. A Systematic Manual of Natural Hygiene. By C. T. KINGZETT, F.I.C., F.C.S. Fourth Edition. Price 10s.

Hygiene. The Elements of School Hygiene for the Use of Teachers and Schools. By W. E. ROTH, B.A. Price 3s. 6d.

Hygiene. Theatre Hygiene, a study in construction, safety and healthy arrangement. By W. E. ROTH, B.A. Oxon. Price 1s. 6d.

Hygiene. Healthy Homes. By STANLEY HAYNES, M.D., M.R.C.S., F.R.G.S. Price 1s.

Hygiene. Notes on Nuisances, Drains, and Dwellings. By W. H. PENNING, F.G.S. Second edition. Price 6d.

Hygiene. Short Lectures on Sanitary Subjects. By RICHARD J. HALTON, L.K.Q.C.P., L.R.C.P. Ed., L.R.C.S.I., etc. Price 5s.

Hygiene. A Manual of Naval Hygiene, with Instructions and Hints on the Preservation of Health and the Prevention of Disease on board Ship. By JOSEPH WILSON, M.D. Second edition. 10s. 6d.

Hygiene. The Sanitation of Public Institutions. The Howard Prize Essay. By R. D. R. SWEETING, M.R.C.S., Medical Superintendent of the Western Fever Hospital. Price 3s. 6d.

Hygiene of Beauty. By Dr. MONIN. Translated by B. CARDWELL. Price 3s. 6d.

Hypnotism. Psycho-Therapeutics. Treatment by Hypnotism and Suggestion. By J. LLOYD TUCKEY, M.D. Third edition, enlarged. Price 6s.

Indigestion : a Manual of the Diagnosis and Modern Treatment of the Different Varieties of Dyspepsia. By GEORGE HERSCHELL, M.D. Lond. New edition. [*In the Press.*]

Inflammation. The State of the Blood and the Bloodvessels in Inflammation. By T. WHARTON JONES, F.R.C.S., F.R.S., Emeritus Professor of Ophthalmic Medicine and Surgery in University College, London. Price 2s. 6d.

"The work is that of a man of genius of the highest order."—Dr. RICHARDSON, F.R.S., in *Asclepiad*.

"A thoughtful study founded on the ripe experience of an author entitled to the highest respect."—*Medical Press.*

Insanity. Handbook for Attendants on the Insane. Price 2s.

International Medical Congress. The Commemorative Portrait-Picture of the International Medical Congress, 1881. Designed and executed by Mr. BARRAUD ; nearly 700 Likenesses of Members, representing Medicine and Surgery in every part of the world ; special sittings accorded for every Portrait.

The Picture is Printed by the New Permanent Carbon Process in two Sizes :

EXTRA SIZE, 47 × 30, MOUNTED, BUT UNFRAMED	£7 10s.	FRAMED	£10 0s.
POPULAR SIZE, 29 × 20, MOUNTED, BUT UNFRAMED	£3 3s.	FRAMED	£4 10s.

Intestinal Surgery. (See Abdominal Surgery.)

Kidneys. Vaso-Renal Change *versus* Bright's Disease. By J. MILNER FOTHERGILL, M.D. Ed. Price 7s. 6d.

Kidneys. Bright's Disease of the Kidneys. By Professor J. M. CHARCOT. Translated by H. B. MILLARD, M.D., A.M. Revised by the Author, with coloured plates, price 7s. 6d.

Kidneys. Movable Kidney and Intermittent Hydronephrosis. By G. D. KNIGHT, M.D. Price 3s. 6d.

Materia Medica. A Dictionary of Materia Medica and Therapeutics. A Résumé of the Action and Doses of all Official and Non-official Drugs now in Common Use. By C. HENRI LEONARD, A.M., M.D., and THOS. CHRISTY, F.L.S., F.C.S. Price 6s. ; half morocco, 8s. 6d.

This volume has been in preparation for the past four years. The drugs of as late introduction as 1891 are to be found in its pages. The authors claim to have incorporated everything of merit, whether official or non-official, that could be found either in standard works or from many manufacturers' catalogues. The scheme embraces the Pronunciation, Genitive case-ending, Common Name, Dose, and Metric Dose. Then the Synonyms, English, French, and German. If a Plant the Part Used, Habitat, Natural Order, and Description of Plant and Flowers, with its Alkaloids, if any. If a Mineral, its Chemical Symbol, Atomic Weight, looks, taste, and how found, and its peculiarities. Then the Action and Uses of the Drug, its Antagonists, Incompatibles, Synergists and Antidotes. Then follow its Official and Non-official preparations, with their Medium and Maximum Doses. Altogether it will be found a handy volume for either the Physician, Student, or Druggist, and will be frequently appealed to if in one's possession.

"Will, we are sure, fulfil a long-felt want."—*British and Colonial Druggist*.

"Well up to date. . . . Contains an index of great value."—*Chemist and Druggist*.

Materia Medica. Table of Doses. By J. H. ALLAN, F.C.S. Price 6d., cloth.

Materia Medica. A Key to Organic Materia Medica. By JOHN MUTER, Ph.D., M.A., F.C.S., President of the Society of Public Analysts. Third edition. Price 12s. 6d.

Materia Medica. Aids to Materia Medica and Therapeutics. By C. E. ARMAND SEMPLE.

Part I.—The Non-metallic and Metallic Elements, Alcoholic and Ethereal Preparations, etc. Cloth, 2s. 6d.; paper, 2s.

Part II.—The Vegetable and Animal Substances. 2s. 6d., 2s.

Part III.—Classification of Remedies. Cloth, 1s. 6d.; paper, 1s.

Part IV.—New Remedies of the British Pharmacopœia. Cloth, 2s. 6d.; paper, 2s.

Part V.—Tablets of Materia Medica. Price, cloth, 1s. 6d.; paper, 1s.

Materia Medica and Pharmacy. A Text-Book for Medical and Pharmaceutical Students preparing for Examination. By W. HANDSEL GRIFFITHS, Ph.D., F.C.S., F.R.C.P. Ed. Third edition. Edited by A. S. GUBB, M.D. Paris, L.R.C.P. Lond., M.R.C.S., D.P.H., Gold Medallist, Prizeman in Materia Medica, Westminster Hospital. Price 7s. 6d.

"A book of great value . . . a standard text-book."—*Edin. Med. Journal*.

"One of the ablest, if not the best, work on the subject in our language."—*Med. Press*.

- Materia Medica.** Notes on Inorganic Materia Medica, and its Chemistry. By J. S. SHARMAN. Second edition. Price 1s. 6d.
- Materia Medica.** Notes on Materia Medica and Therapeutics. Mineral Drugs, Part I. By J. S. MCARDLE. Price 1s.
- Medical Charities.** The Reform of Our Voluntary Medical Charities. By ROBERT REID RENTOUL, M.D. Price 5s.
- Medical Education.** Medical Education and Organization. The Hunterian Oration for 1880. By WALTER RIVINGTON, B.A., M.B., F.R.C.S., Surgeon to the London Hospital. Price 1s.
- Medical Etiquette.** A Few Rules of Medical Etiquette. By a L.R.C.P. Lond. Price 1s.
- Medical Jurisprudence.** (See Forensic Medicine.)
- Medical Laws.** Medical Law for Medical Men: their Legal Relations popularly explained. By Professor MEYMOTT TIDY, M.B., F.C.S., Barrister-at-Law, and PERCY CLARKE, LL.B., Solicitor. Leather, gilt edges, price 4s.
- Medical Laws.** The Laws Relating to Medical Men. By JAMES GREENWOOD, Barrister-at-Law. Price 5s.
 "Admirably suited as a guide to the busy practitioner, who frequently runs great risks of becoming involved in legal penalties, in consequence of an imperfect knowledge of the law."
—Glasgow Medical Journal.
- Medical Profession.** A Guide to the Medical Profession in all its branches, including the Public Services. By C. R. B. KEETLEY, F.R.C.S. Second edition. Price 3s. 6d.
- Medical Profession.** Medical Men and Manners of the Nineteenth Century. By a Physician. Third Thousand. Price 3s.
 "At times scathing, at others amusing, the author is never dull, and writes as one who knows the many blots on our system, and honestly tries to remedy them."
—Medical Press.
- Medicine.** Dictionary of Medicine. (See p. 18.)
- Medicine.** Aids to Medicine. By C. E. ARMAND SEMPLE, B.A. M.B. Cantab., M.R.C.P. Lond.
 Part I.—General Diseases. Price 2s. 6d. and 2s.
 Part II.—The Urine, Kidneys, Stomach, Peritoneum, Throat, and Œsophagus. Third Thousand. Price 2s. 6d. and 2s.
 Part III.—Diseases of the Brain, Nervous System, and Spinal Cord. Third Thousand. Price 2s. 6d. and 2s.
 Part IV.—Fevers, Skin Diseases. Price 2s. 6d. and 2s.
- Medicine.** A Chronology of Medicine from the Earliest Times. By J. MORGAN RICHARDS. Price 10s. 6d.
- Medicine.** Student's Handbook of the Practice of Medicine. By H. AUBREY HUSBAND, M.B., C.M., B.Sc. Fifth edition. Illustrated. [*In the Press.*]
- Medicinal Remedies.** Notes on Medicinal Remedies. By J. B. STEPHENSON. Price 1s. 6d.

Medico-Military Services. Our Services under the Crown. A Historical Sketch of the Army Medical Staff. By Surgeon-Major A. GORE, M.D., Sanitary Officer on the Staff. Price 6s.

Memory. Its Logical Relations and Cultivation. By F. W. EDRIDGE-GREEN, M.D., F.G.S., Author of "Colour Blindness." Second edition. Price 6s.

Meteorology. The Moon and the Weather · the Probability of Lunar Influence Reconsidered. Showing how storms and depressions may be predicted. By WALTER J. BROWNE (St. Petersburg). Second edition. Price 3s.

Microscopical Science. The International Journal of Microscopy and Natural Science. Edited for the Postal Microscopical Society by ALFRED ALLEN. Quarterly, with Plates. Price 2s. 6d.

Microscopical Science. Modern Microscopy. A Handbook for Beginners, in two parts. I. The Microscope, and Instructions for its Use. II. Microscopic Objects: How Prepared and Mounted. By M. I. CROSS and MARTIN J. COLE. Price 2s. 6d.

Midwifery. (See Obstetrics.)

Mineral Waters. The Mineral Waters of Europe. A complete Analytical Guide to all the Bottled Waters, and their Medicinal and Therapeutic Values. By Professor TICHBORNE, LL.D., and M. PROSSER JAMES, M.R.C.P. Lond. Price 3s. 6d.

"Such a book as this is simply invaluable."—*The World*.

Morals. A Physician's Sermon to Young Men. By WILLIAM PRATT, M.A., M.D., etc. Eighth thousand. Price 1s. cloth.

"The delicate topic is handled wisely, judiciously, and religiously, as well as very plainly."—*The Guardian*.

Morals. Revelations of Quacks and Quackery. With Facts and Cases in Illustration of their Nefarious Practices. By "DETECTOR." Thirtieth thousand. Price 2s.

Morphia. On the cure of the Morphia Habit. By OSCAR JENNINGS, M.D. Paris, F.R.C.S. Eng. Price 2s. 6d.

Nerve Supply. Atlas of Cutaneous Nerve Supply. By JACOB HEIBERG, M.D., and W. W. WAGSTAFFE, F.R.C.S. Containing 10 plates in colours. Price 4s. 6d.

Nervous Diseases. Functional Nervous Diseases, their Causes and Treatment. By GEO. T. STEVENS, M.D., Ph.D. With plates. Price 12s.

Nervous Diseases. Clinical Notes on Nerve Disorders in Surgical Practice. By GEO. WHERRY, M.A., M.S. Cantab., F.R.C.S. Price 2s.

Nervous Diseases. (See also Brain.)

- Neuralgia.** The Surgical Treatment of Neuralgia of the Fifth Nerve; being the Lettsomian Lectures for 1892. By WM. ROSE, M.B., B.S. Lond., F.R.C.S., Joint Professor of Surgery in King's College, London, and Surgeon to King's College Hospital. Illustrated. Price 4s. 6d.
- Nose.** A Handbook of Diseases of the Nose and Pharynx. By JAS. B. BALL, M.D. (Lond.), M.R.C.P., Physician to the West London Hospital. Second edition. Price 7s. 6d.
- Nursing.** Handbook for Attendants on the Insane. Published by the authority of the Medico-Psychological Association. With illustrations and questions for examinations. Second edition. Price 2s.
- Nursing.** Handbook of Obstetrical and Gynæcological Nursing, being the fifth edition of "A Manual for Midwives." By the late Dr. FLEETWOOD CHURCHILL. Revised and greatly enlarged by THOS. MORE MADDEN, M.D., F.R.C.S. Eng. With numerous illustrations. Price 4s. net.
- Nursing.** Questions and Answers on Nursing, for St. John's Ambulance Associations, Nursing Institutes, and Nurses generally. By JOHN W. MARTIN, M.D., Author of "Ambulance Work." Fourth thousand. Price 1s. 6d. net.
- Nursing.** How to Feed an Infant. With an Appendix on the Common Ailments of Infancy, with their Hygienic and Curative Treatment. By BENSON BAKER, M.D. Price 1s. 6d.
- Nursing.** How to bring up Children by Hand. By J. FOSTER PALMER, L.R.C.P. Price 6d.
- Nursing.** Practical Guide for the Young Mother. From the French of Dr. BROCHARD, Director-General of Nurseries and Crèches, with Notes and Hints by a London Physician. Price 2s.
- Obstetrics.** Aids to Obstetrics. By SAMUEL NALL, M.B. Cantab., M.R.C.P. Lond., First Class Honours Nat. Sci. Cambridge, late Resident Obstetric Assistant, St. Bartholomew's Hospital. Twelfth thousand. Price 2s. 6d. cloth; 2s. paper wrapper.
- Obstetrics.** Hints for Midwives on Pregnancy and Labour. Abstracts of a Series of Lectures by H. MACNAUGHTON JONES, M.D., M.C.H., F.R.C.S. Price 1s. net.
- Obstetrics.** The Diagnosis and Treatment of Extra-uterine Pregnancy. By JOHN STRAHAN, M.D., M.Ch. (The Jenks Triennial Prize Essay awarded by the College of Physicians, 1889.) Price 4s. 6d.
- Obstetrics.** Hints for the Use of Midwives preparatory to their Examinations. By R. J. M. COFFIN, F.R.C.P. Ed. Second Edition, enlarged. Price 2s.

Odontology. (See Dental.)

Old Age. The Diseases of Sedentary and Advanced Life. By J. MILNER FOTHERGILL, M.D., M.R.C.P. Lond. Price 7s. 6d.

Ophthalmology. (See Eye.)

Osteology. Osteology for Students, with Atlas of Plates. By ARTHUR TREHERN NORTON, F.R.C.S., Surgeon to, and Lecturer on Surgery at, St. Mary's Hospital. Atlas and Text in one volume, 7s. 6d. ; in two volumes, 8s. 6d.

"The handiest and most complete handbook on Osteology."—*The Lancet*.

Osteology. Atlas of the Skeleton and its Articulations, showing the Bones and Ligaments of the Human Body and Limbs. By Professor WITKOWSKI. Price 7s. 6d. (See Anatomy.)

Overwork. Overwork and Premature Mental Decay : its Treatment. By C. H. F. ROUTH, M.D., M.R.C.P. Lond. Fourth edition. Price 2s. 6d.

Pathology. Lectures on Medical Pathology. By H. G. SUTTON, M.B., F.R.C.P. Lond., late Physician to, and Lecturer on Pathology at, the London Hospital. Price 5s.

"Such a work is to be accepted with gratitude for the thoughts it contains, and the on which they are based."—*The Lancet*.

Pathology. Handbook of Medical Pathology for the use of Students in the Museum. By Drs. HERRINGHAM, GARROD, and GOW, of St. Bartholomew's Hospital. Price 7s. 6d.

Pathology. Handbook of Surgical Pathology. Edited by W. J. WALSHAM, M.B., F.R.C.S., and D'ARCY POWER, M.B. Oxon., F.R.C.S. Second edition. Price 9s.

"An embodiment of the most modern pathological teaching."—*The Lancet*.

Pathology. Aids to Pathology. By GILBERT A. BANNATYNE, M.D. General : Cloth, 1s. 6d. sewn, 1s. Special : Cloth, 2s. 6d. ; sewn, 2s.

Pathology. Illustrations of Pathological Anatomy issued in parts, each containing 4 plates in colours, with descriptive text by PROFESSORS KAST, of Breslau, and RUMPEL, of Hamburg. The English edition revised and edited by M. ARMAND RUFFER, M.D. Oxon. Twelve parts by subscription, post free, £2 8s. Single parts, 6s. each. Single plates, 1s. 6d. each.

Pathology. Examination Cards. Arranged as questions and answers for self-examination. By A. T. SCHOFIELD, M.D., M.R.C.S. Complete in two sets of cards, price 9d. net per set.

Mr. Jonathan Hutchinson, F.R.C.S., writes : "It is an invaluable means of self-tuition."

Peritonitis. Localised Peritonitis : its Etiology, Diagnosis, and Treatment. By JOHN WALLACE, M.D., Professor of Midwifery in the Victoria University. Illustrated. Price 1s.

- Pharmacopœia.** A Vest-Pocket Epitome of the British Pharmacopœia. By RUSSELL COOMBE, M.A., F.R.C.S. Cloth, price 1s.
- Pharmacopœia.** The Pocket Pharmacopœia. A Précis of the British Pharmacopœia, including the Therapeutical Action of the Drugs, their Natural Orders and Active Principles. By C. ARMAND SEMPLE, M.D., M.R.C.P. Second edition, with the Appendix of 1890. Price 3s. 6d.
- Pharmacopœia.** Notes on the Pharmacopœial Preparations for Pharmaceutical Students. By HANDSEL GRIFFITHS; revised by A. S. GUBB, M.D. Paris, L.R.C.P., M.R.C.S., D.P.H. Price 3s. 6d.
- Pharmacy.** Latin Grammar of Pharmacy, for the use of Students, with an Essay on Latin Prescriptions. By JOSEPH INCE, A.K.C.L., formerly Examiner and Member of Council, Pharmaceutical Society. Sixth edition. Price 5s.
- Pharmacy.** Aids to Pharmacy. By C. E. ARMAND SEMPLE, M.B. Cantab., M.R.C.P. Lond. Cloth, price 2s. 6d.; paper, 2s.
- Pharmacy.** Practical Pharmacy for Medical Students. By A. CAMPBELL STARK, Demonstrator on Materia Medica and Pharmacy at St. George's Hospital. Price 3s. 6d., or interleaved for note-taking, 4s. 6d.
- Pharmacy.** Doses and Strengths of the British Pharmacopœia. By the Principals of the Middlesex College of Chemistry. Price 6d.
- Phimosis.** Its Causes, Symptoms, and Treatment; with a description of the ancient rite of circumcision. By L. H. ORMSBY, M.D., F.R.C.S.I., Lecturer on Clinical and Operative Surgery at, and Surgeon to, the Children's Hospital, Dublin. Price 1s.
- Physics.** A Manual of Physics. Being an Introduction to the Study of Physical Science designed for University Students. By W. PEDDIE, D.Sc., F.R.S.E., Lecturer on Physics in the University of Edinburgh. (*University Series of Manuals.*) 7s. 6d.
- "Altogether worthy of praise. . . . We have no hesitation in giving it high commendation. . . . We wish it all success, feeling well satisfied that it meets a decided want."—*Nature*.
- "Dr. Peddie's manual is deserving of the highest praise."—*Lancet*.
- "Written with a precision of statement and clearness of exposition which does the writer infinite credit."—*Dundee Advertiser*.
- "A very handy work of reference."—*University Correspondent*.
- "The work must be pronounced highly satisfactory, creditable to author and publishers, and calculated to be useful to the readers for whom it is intended."—*Chemical News*.
- "The book deserves an extended circulation."—*Science and Art*.
- Physiological Chemistry.** Aids to Physiological Chemistry. By J. L. THUDICHUM, M.D., F.R.C.P. Lond., St. Thomas's Hospital. Cloth, price 2s. 6d. Sewn, 2s.
- Physiological Factor in Diagnosis.** By J. MILNER FOTHERGILL, M.D., M.R.C.P. Lond., Physician to the City of London Hospital for Diseases of the Chest. Second edition. Price 7s. 6d.

Physiology. A Manual of Physiology. By G. N. STEWART, M.A., D.Sc. University of Cambridge. (*University Series of Manuals.*) [In the Press.]

Physiology. The Physiologist in the Household. By J. MILNER FOTHERGILL, M.D., M.R.C.P. Part I.—Adolescence. Price 1s.

Physiology. Aids to Physiology. By B. THOMPSON LOWNE, F.R.C.S., Arris and Gale Lecturer, and Examiner in Physiology, Royal College of Surgeons of England. Fourth thousand, illustrated. In two parts, 2s. each, or in one vol., cloth, 4s. 6d.

"As 'aids' and not substitutes, they will prove of real value to students."—*Medical Press.*

"Certainly one of the best of the now popular 'Aid Series.'"—*Students' Journal.*

Plant Analysis. (See Chemistry.)

Polypus in the Nose and other Affections of the Nasal Cavity; their successful treatment. By J. L. W. THUDICHUM, M.D., F.R.C.P. Lond. Seventh edition, enlarged. Price 2s. 6d.

Population. On the Evils, Moral and Physical, likely to follow, if practices, intended to act as checks to population, be not strongly discouraged and condemned. By C. H. F. ROUTH, M.D., F.R.C.P. Second thousand. Price 1s.

Posology. Posological Tables: a Classified Chart, showing at a glance the Dose of every Official Substance and Preparation. By HANDSEL GRIFFITHS, Ph.D., L.R.C.P. Fifth edition, revised by PETER W. SQUIRE, F.L.S., F.C.S. Price 1s.; or mounted on linen, rollers, and varnished, 3s. 6d.

Pregnancy. (See Obstetrics.)

Prescriptions. The Student's Pocket Prescriber. By H. AUBREY HUSBAND, M.B., F.R.C.S.E. Price 1s. cloth.

Psychological Medicine in John Hunter's Time and the Progress it has made. By FLETCHER BEACH, M.B., F.R.C.P. Price 1s.

Psycho-Therapeutics. (See Hypnotism.)

Public Health. Aids to Sanitary Science, for the Use of Candidates for Public Health Qualifications. By F. J. ALLAN, M.D., Dipl. Public Health, Camb., Assistant Professor of Hygiene, College of State Medicine. Price 4s. 6d. cloth.

"A really admirable synopsis of what it is most necessary for a candidate to know."—*Glasgow Medical Journal.*

"The information contained is correct, well expressed and well arranged."—*Public Health.*

"The work has been well done. . . . Will be found a serviceable and reliable aid."—*Edinburgh Medical Journal.*

Public Health. The Practical Guide to the Public Health Acts and Correlated Acts for Officers of Health and Inspectors of Nuisances. By THOS. WHITESIDE HIME, B.A., M.B. Second edition, enlarged. Price .

Public Health. Aids to Public Health. By J. L. THUDICHUM, M.D., F.R.C.P. Lond. Price 1s. 6d. cloth; 1s. paper.

Public Health. Guide to Sanitary Science Examinations. By HERBERT JONES, D.P.H. Cantab. Price 2s. 6d.

Pulse. How to feel the Pulse and what to Feel in it. Practical Hints for Beginners. By WILLIAM EWART, M.D., F.R.C.P. Lond., Physician to St. George's Hospital. With a glossary and twelve illustrations. Price 3s. 6d.

Pulse. The Sphygmograph: its History and use as an aid to Diagnosis. By R. E. DUDGEON, M.D. Price 2s. 6d.

Rabies. (See Hydrophobia.)

Respiration. Keep your Mouth Shut; a Popular Treatise on Mouth-breathing. By FRED. A. A. SMITH, M.D., C.M. Glas. Price 2s. 6d.

Rheumatism. Its Treatment by Electric Massage, etc., in connection with the Wiesbaden Thermal Waters. By CARL MORDHORST, M.D. Kiel. Price 1s.

Rupture of the Perineum. Its Causes, Prevention and Treatment. By MICHAEL JOSEPH MOLONY M.R.C.P., L.R.C.S. Price 2s. cloth, 1s. 6d. paper.

Salt. History of Salt, with Observations on its Medicinal and Dietetic Properties. By EVAN MARLETT BODDY, F.R.C.S., F.S.S., L.R.C.P. Price 2s. 6d.

Sewage. The Sewage Question: Reports upon the Principal Sewage Farms and Works of the Kingdom, with Notes and Chemical Analyses. By the late Dr. LETHEBY. Price 4s. 6d.

Skin Diseases of Infancy and Early Life. By C. M. CAMPBELL, M.D., C.M. Edin. Price 5s.

Skin. A Synopsis of Diseases of the Skin and Hair. By R. GLASGOW PATTESON, M.B., Surgeon to St. Vincent's Hospital. Price 1s.

Skin. Dermic Memoranda: An Introduction to the Study of Skin Disease, with Special Reference to the Exanthemata. By WILLIAM GEMMEL, M.B., Glasgow Fever Hospital. Price 3s. net.

Skin. Some Diseases of the Skin produced by Derangements of the Nervous System. By T. STRETCH DOWSE, M.D., F.R.C.P.E. Price 2s.

Stomach. The Surgical Diseases and Injuries of the Stomach and Intestines. By F. BOWREMAN JESSETT, F.R.C.S., Surgeon to the Cancer Hospital. Numerous engravings. Price 7s. 6d.

Stricture. Stricture of the Urethra : its Diagnosis and Treatment. By E. DISTIN MADDICK, F.R.C.S. Edin., late Surgeon R.N. 4s.

Surgery. The Science and Practice of Surgery, a Complete Text-book. By F. J. GANT, F.R.C.S., Senior Surgeon Royal Free Hospital. Third edition, with nearly 1,100 engravings. 2 vols., price 36s.

"The entire work has been revised to present the modern aspects of Surgery."—*Lancet*.

"Does credit to the author's thorough surgical knowledge."—*British Medical Journal*.

Surgery. The Student's Surgery : a Multum in Parvo. By F. J. GANT, F.R.C.S. 850 pp., illustrated. Price 10s. 6d.

"It well fulfils the object for which it is written."—*Lancet*.

"From the student's point of view it is a necessity."—*British Medical Journal*.

Surgery. **Operative Surgery on the Cadaver.** By JASPER J. GARMANY, A.M., M.D., F.R.C.S. Price 8s. 6d.

Surgery. Aids to Surgery. By GEORGE BROWN, M.R.C.S. 2 parts, price 1s. 6d. cloth, and 1s. sewn, each ; or in 1 vol., 2s. 6d.

Surgery. The Text-book of Operative Surgery. With 88 beautifully engraved steel plates, after BERNARD and HUETTE. Text by ARTHUR TREHERN NORTON, F.R.C.S., Surgeon to, and Lecturer on Surgery at, St. Mary's Hospital. Second edition, half calf, plain, 25s. ; hand-coloured, 50s.

Surgery. Clinical Lectures on Recent Surgery. By ARTHUR TREHERN NORTON, F.R.C.S. Price 3s.

Surgery. The Anatomy of Surgery. By JOHN McLACHLAN, M.B., M.R.C.S. With 74 illustrations. Two vols., price 18s.

Surgery. The Surgery of the Knee-Joint, and the Responsibility placed on the Physician and General Practitioner by the Modern Process of Surgery. By C. B. KEETLEY, F.R.C.S., Senior Surgeon to the West London Hospital, and Surgeon to its Orthopædic Department. Cloth, price 1s. 6d.

Surgery. **Brain Surgery.** By M. ALLEN STORR, M.D. With 59 illustrations. Price 10s. 6d.

Surgery, Minor—and Bandaging. Questions and Answers for Self-examination. By A. T. SCHOFIELD, M.D. Price 9d. net.

Surgical Pathology. Handbook of Surgical Pathology. By W. J. WALSHAM, M.B., F.R.C.S., and D'ARCY POWER, M.B., F.R.C.S. Second edition. Price 9s.

"An embodiment of the most modern pathological teaching."—*The Lancet*.

Surgical Anatomy. (See Surgery.)

Surgical Treatment. Notes on Surgical Treatment and Minor Operations. Designed especially for House Surgeons and Students. By T. F. HOPGOOD, L.R.C.P., M.R.C.S. Surgeon to the Sunderland Infirmary. Price 2s. 6d.

Syphilis. Syphilis of the Brain and Spinal Cord, showing the part which this agent plays in the production of Paralysis, Epilepsy, Insanity, Headache, Neuralgia, Hysteria, and other Mental and Nervous Derangements. By T. STRETCH DOWSE, M.D., F.R.C.P. Ed. Second edition, illustrated. Price 5s.

Syphilis. The Nature and Treatment of Syphilis, and the other so-called Contagious Diseases. By C. R. DRYSDALE, M.D., M.R.C.P. Lond., F.R.C.S. Eng. Fifth edition. Price 5s.

Temperature Charts for Recording the Range of Temperature, Pulse, Respiration, History, Progress, and Treatment of Cases. By E. W. MOORE, M.D., M.R.C.P. Price 1d. each, 9d. per dozen; or mounted, similar to a blotting-pad, 50, 3s. 6d.; 100, 7s.

Theories of Life. The Protoplasmic Theory of Life. By JOHN DRYSDALE, M.D., F.R.M.S. Price 5s.

Theories of Life. How to Prolong Life. Showing the Diet and Agents best adapted for a lengthened prolongation of existence. By C. W. DE LACY EVANS, M.R.C.S. Second edition. Price 5s.
 "A good account of the changes which occur with the advance of age."—*Lancet*.

Therapeutics. Modern Therapeutics, Medical and Surgical. By GEO. H. NAPHEYS, A.M., M.D. Ninth edition. Revised and enlarged by Drs. Allen Smith and Aubrey Davis.

Vol. I.—General Medicine, and Diseases of Children. Price, half morocco, £1 10s.

Vol. II.—General Surgery, Gynæcology, and Obstetrics. Price, half morocco, £1 10s.

Therapeutics. The Therapeutics of the Respiratory Passages. By PROSSER JAMES, M.D., Lecturer on Materia Medica and Therapeutics at the London Hospital. Price 10s. 6d.

"Dr. Prosser James has produced a scholarly treatise."—*New York Medical Record*.

Therapeutics. Aids to Rational Therapeutics, for the guidance of Practitioners and Senior Students. By J. MILNER FOTHERGILL, M.D. Second edition. Price 2s. 6d. cloth; 2s. paper wrapper.

Throat. Movable Atlas of the Throat, and the Mechanism of Voice, Speech and Taste. By Prof. WITKOWSKI. (See Anatomy.)

Throat. Diseases of the Throat and Nose. A Practical Guide to Diagnosis and Treatment. With 220 typical illustrations in chromolithography and numerous wood engravings. By LENNOX BROWNE, F.R.C.S. Edin., Senior Surgeon to the Central London Throat and Ear Hospital. Fourth edition. Price 21s.

"One of the completest treatises on diseases of the throat in any language."—*British Medical Journal*.

"The best text-book in the English language."—*Edinburgh Medical Journal*.

- Throat.** Affections of the Throat and Larynx. By ARTHUR TREHERN NORTON, F.R.C.S., Surgeon to St. Mary's Hospital. Second edition, illustrated. Price 6s.
 "Short, simple, and thoroughly practical instruction."—*Medical Press.*
- Throat.** Tonsillitis in Adolescents. By C. HAIG-BROWN, M.D., C.M., Medical Officer to the Charterhouse. Price 3s.
- Transfusion.** On Transfusion of Blood and Saline Fluids. By C. EGERTON JENNINGS, F.R.C.S. Third edition, with Preface by SIR SPENCER WELLS, Bart. Price 4s. 6d.
- Tuberculosis.** (See Consumption.)
- Ulcers.** Ulcers and their Treatment. Intended for the Use of Dressers, and as an Aid to those Preparing for Examinations. By W. S. CRAWFORD, B.A. Cantab. Price, paper cover, 1s.; cloth, 1s. 6d.
- Urinary Diseases.** Diseases of the Bladder, Prostate Gland, and Urethra. By F. J. GANT, F.R.C.S., Senior Surgeon to the Royal Free Hospital. Fifth edition, enlarged. Price 12s. 6d.
 "The work throughout bears evidence of having been written by a thoroughly practical and experienced surgeon."—*Lancet.*
- Urinary Surgery.** Urinary Surgery of the present day contrasted with that of twelve years ago. By F. SWINFORD EDWARDS, F.R.C.S. Price 1s.
- Urine.** The Urine in Health and Disease, and Urinary Analysis. By D. CAMPBELL BLACK, M.D., Professor of Physiology in Anderson's College, Glasgow. Price 7s. 6d.
- Urine.** The Urine; a Guide to its Practical Examination. By J. TYSON, M.D., Professor of Morbid Anatomy in the University, and President of the Pathological Society of Philadelphia. Seventh edition, with numerous illustrations. Price 7s. 6d.
 "We think it the most practically useful guide we have on the subject."—*Medical Record.*
- Vichy.** Vichy and its Therapeutical Resources. By PROSSER JAMES, M.D., M.R.C.P. Lond. Price 2s. 6d.
- Voice.** The Philosophy of Voice. Showing the right and wrong Action of the Breath and Vocal Cords in Speech and Song. By CHARLES LUNN. Seventh edition. [*In preparation.*]
- Voice.** Artistic Voice in Speech and Song. Dedicated to Mr. Sims Reeves and Mr. Santley. By the same Author. 1s.
- Voice.** The Voice Musically and Medically Considered. By C. ARMAND SEMPLE, M.B. Cantab., M.R.C.P. Lond., Physician to the Royal Society of Musicians. Part I. Musical, price 1s.; Part II., Medical, price 2s.; or in one vol., cloth, 3s. 6d.
- Whooping-Cough.** Its Pathology and Treatment. Fothergillian Prize Essay. By THOS. M. DOLAN, M.D., F.R.C.S.E. Price 3s. 6d.
- Zoology and Comparative Anatomy, Aids to.** By MAJOR GREENWOOD, M.D., Honours. Price 2s. 6d., and 2s.

THE STUDENTS' AIDS SERIES.

Specially designed to assist Students in committing to memory and grouping the subjects upon which they are to be examined.

Aids to Analysis of Food and Drugs. By H. AUBREY HUSBAND, M.B., F.R.C.S. 1s. 6d. cloth ; 1s. paper.

Aids to Anatomy. By GEORGE BROWN, M.R.C.S., Gold Medalist, Charing Cross Hospital. 2s. 6d. cloth ; 2s. paper.

Aids to Biology. By JOSEPH W. WILLIAMS. 2s. 6d. cloth ; 2s. paper wrapper.

Aids to Botany. By C. E. ARMAND SEMPLE, B.A., M.B. Cantab., M.R.C.P. Lond., late Senior Examiner in Arts at Apothecaries' Hall. Third thousand. 2s. 6d. cloth ; 2s. paper.

Aids to Chemistry. By the same Author.

Part I.—Inorganic: Non-Metallic Substances. 2s. 6d. cloth ; 2s. paper wrapper.

Part II.—Inorganic: The Metals. 2s. 6d. and 2s.

Part III.—Organic. Price, 2s. 6d. and 2s.

Part IV.—Tablets of Chemical Analysis. 1s. 6d. and 1s.

Aids to Practical Chemistry. Especially arranged for the Analysis of Substances containing a Single Base and Acid Radicle. By T. HURD GORDON. 2s. 6d. cloth ; 2s. paper.

Aids to the Diagnosis and Treatment of Diseases of Children. By JOHN MCCAW, M.D., L.R.C.P. Price 3s. 6d. cloth ; 3s. paper.

Aids to Dental Surgery. By ARTHUR S. UNDERWOOD, M.B., M.R.C.S., Lecturer on Dental Surgery at the Dental Hospital of London. 2s. 6d. cloth ; 2s. paper.

Aids to Dental Histology. By the same Author. Illustrated. 2s. 6d. cloth ; 2s. paper.

Aids to Diagnosis. Part I.—Semeiological. By J. MILNER FOTHERGILL, M.D., M.R.C.P. Lond. 1s. 6d. cloth ; 1s. paper.

Part II.—Physical. By J. C. THOROWGOOD, M.D., F.R.C.P. Lond. 1s. 6d. and 1s.

Part III.—What to Ask the Patient. By J. MILNER FOTHERGILL, M.D., M.R.C.P. Lond. 1s. 6d. and 1s. The three in one vol., 3s. 6d.

"A mine of valuable information."—*Edinburgh Medical Journal.*

Aids to Examinations. Being Questions and Answers on Materia Medica, Medicine, Midwifery, Pathology, etc. By D. WALSH, M.B., C.M., L.R.C.P. New edition. 2s. 6d. and 2s.

Aids to Forensic Medicine and Toxicology. By WM. MURRELL, M.D., F.R.C.P. Lond., Physician to Westminster Hospital. New edition. Price 2s. 6d. cloth ; 2s. paper wrapper.

Aids to Gynæcology. By ALFRED GUBB, M.D. Paris, D.P.H., Obstetric Assistant and Gold Medallist, Westminster Hospital. New edition. Cloth, 2s. 6d. ; paper wrapper, 2s.

Aids to Materia Medica and Therapeutics. By C. E. ARMAND SEMPLE, B.A., M.B. Cantab., M.R.C.P. Lond.

Part I.—The Non-Metallic and Metallic Elements, Alcoholic and Ethereal Preparations. 2s. 6d. cloth ; and 2s. paper.

Part II.—Vegetable and Animal Substances, 2s. 6d. and 2s.

Part III.—Classification of Remedies, 1s. 6d. and 1s.

Part IV.—New Remedies. 2s. 6d. and 2s.

Part V.—Tablets of Materia Medica. Price 1s. 6d. and 1s.

Aids to Medicine. By the same Author.

Part I.—General Diseases. Lungs, Heart, and Liver. Cloth, 2s. 6d. ; paper, 2s.

Part II.—The Urine, Kidneys, etc. 2s. 6d. and 2s.

Part III.—The Brain and Nervous System. 2s. 6d. and 2s.

Part IV.—The Fevers, Skin Diseases, etc. 2s. 6d. and 2s.

Aids to Obstetrics. By SAMUEL NALL, B.A., M.B. Cantab., M.R.C.P. Lond., late House Physician and Resident Obstetric Assistant, St. Bartholomew's Hospital. Twelfth thousand. Cloth, 2s. 6d. ; paper, 2s.

Aids to Ophthalmic Medicine and Surgery. By JONATHAN HUTCHINSON, jun., F.R.C.S. Cloth, 2s. 6d. ; paper, 2s.

Aids to Otology. By W. R. H. STEWART, F.R.C.S. Ed., Aural Surgeon to the Great Northern Hospital, etc. Price 2s. 6d. cloth ; 2s. paper wrapper.

Aids to General Pathology. By GILBERT A. BANNATYNE, M.D. Cloth, 1s. 6d. ; paper wrapper, 1s.

Aids to Special Pathology. By the same Author. Cloth, 2s. 6d. ; paper, 2s.

Aids to Pharmacy. By C. E. ARMAND SEMPLE, B.A., M.B. Cantab., M.R.C.P. London. Cloth, 2s. 6d. ; paper, 2s.

Aids to Physiology. By B. THOMPSON LOWNE, F.R.C.S., Examiner in Physiology, Royal College of Surgeons. Fourth thousand. In two parts, price 2s. each ; or in one vol., cloth, 4s. 6d.

"Certainly one of the best of the now popular Aids Series."—*Students' Journal*.

- Aids to Practical Physiology.** By J. BRINDLEY JAMES, M.R.C.S. Cloth, 1s. 6d. ; paper, 1s.
- Aids to Physiological Chemistry.** By J. L. THUDICHUM, M.D., F.R.C.P. Lond., formerly Lecturer on Physiological Chemistry, St. Thomas's Hospital. Cloth, 2s. 6d. ; paper, 2s.
- Aids to Psychological Medicine.** By EDWIN GOODALL, M.D. Lond. [In preparation.]
- Aids to Public Health.** By J. L. THUDICHUM, M.D., F.R.C.P. Lond. New edition. 1s. 6d. cloth ; 1s. paper wrapper.
- Aids to Sanitary Science for the Use of Candidates for Public Health Qualifications.** By F. J. ALLAN, M.D., Assistant Professor of Hygiene, Coll. State Medicine. 236 pp. Cloth, 4s. 6d. ; or in two parts, paper, 2s. each.
- Aids to Surgery.** In two parts. By GEORGE BROWN, M.R.C.S. 1s. 6d. cloth, and 1s. paper, each ; or in one vol., cloth, 2s. 6d.
- Aids to Rational Therapeutics.** By J. MILNER FOTHERGILL, M.D., M.R.C.P. Lond. 2s. 6d. cloth ; 2s. paper.
- Replies to Questions in Therapeutics.** By BRINDLEY JAMES, M.R.C.S. 1s. 6d. cloth ; 1s. paper.
- Aids to Zoology.** By MAJOR GREENWOOD, M.D. Honours in Zoology, University of London. 2s. 6d. cloth ; 2s. paper.
- Aids to Mathematics of Hygiene.** By R. BRUCE FERGUSON, M.A., M.B. Price 2s. 6d. ; 2s.

Aids to Analytical Geometry.

The Straight Line and Circle. By A. LE SUEUR, B.A. Cantab. Second edition. Price 2s.

The Conic Sections, with solutions of questions set at the London and other University Examinations. By GEORGE HEPPEL, M.A., St. John's College, Cambridge, Member of London Mathematical Society. Price 2s.

*** A Catalogue of Standard French Works on Medicine, Surgery, and the Allied Sciences will be sent post free on application.*

WORKS

ON

VETERINARY MEDICINE AND SURGERY.

Amateur. Horses: their Rational Treatment and the Causes of their Premature Decay. By AMATEUR. Price 5s.

——— An Abridgment of the above. By the same Author. Price 1s.

Banham. Tables of Veterinary Posology and Therapeutics. With Weights, Measures, etc. By Professor GEORGE A. BANHAM, F.R.C.V.S. Price 2s. 6d.

Beacock. Prize Essay on the Breeding, Rearing, and Fattening of Cattle and Sheep, and proper treatment of Cows at time of Calving. By JOSEPH BEACOCK. Price 3d.

Burke. The Tropical Diseases of the Horse. By Captain R. W. BURKE, M.R.C.V.S., A.V.D. Third edition. [*In the Press.*]

Courtenay. The Practice of Veterinary Medicine and Surgery. By E. COURTENAY. Price 10s. 6d.

"Written in a clear and concise style: will form a welcome addition to the library of the horse-owner, and those who take an interest in domesticated animals generally."—*Mark Lane Express.*

Fleming. A Text-Book of Veterinary Obstetrics, including the diseases and accidents incidental to pregnancy, parturition and early age in the Domesticated Animals. By GEORGE FLEMING, C.B., LL.D., F.R.C.V.S., F.R.G.S., President of the Royal College of Veterinary Surgeons, late Principal of the Army Veterinary Department. Profusely illustrated. Cloth, price 30s.

"Has filled up a void in a more satisfactory and complete way than any other member of his profession could have done."—*The Field.*

"No man who makes any pretensions to veterinary science or stock breeding can dispense with this work."—*Live Stock Journal.*

——— Parasites and Parasitic Diseases of the Domesticated Animals. A Treatise by L. G. NEUMANN, Professor at the National Veterinary School of Toulouse. Translated and Edited by GEO. FLEMING, C.B., LL.D., F.R.C.V.S., with 365 illustrations. Price 25s.

"The value and importance of Neumann's Treatise cannot be over-estimated; it is certainly the most scientific, interesting, and useful work that has graced veterinary literature for some years."—*The Veterinary Journal.*

"We do not hesitate to say that this is a work which all pathologists ought to possess; and the practitioner . . . will not fail to add to his reputation if he has this book on his shelves."—*The Lancet.*

"This is one of the most useful of the many works with which Dr. Fleming has enriched English Veterinary literature. Although intended as a text-book for the veterinary student and practitioner, the translation has rendered it so readable that every intelligent farmer may derive a fund of useful information from its copiously illustrated pages."—*Mark Lane Express.*

"Cannot fail to be of immense value to both the veterinary profession and to British stock-breeder."—*Bell's Weekly Messenger.*

——— A Text-Book of Operative Veterinary Surgery. Part I. price 10s. 6d. Part II. *in the Press.*

- Fleming.** The Contagious Diseases of Animals: their influence on the wealth and health of the nation. Price 6d.
- Animal Plagues; their History from the Earliest Times, Nature, and Prevention. Vol. I., to 1800. Price 15s.
- Vol. II., from A.D. 1800 to 1844. Price 12s.
- On Roaring in Horses (**Laryngismus Paralyticus**). Its History, Pathology, and Treatment. With coloured plate and woodcuts. Price 6s.
- Tuberculosis from a Sanitary and Pathological point of view. Price 1s.
- Human and Animal Variolæ. A Study of Comparative Pathology. Price 1s.
- Practical Horse Shoeing. With 37 illustrations. 2s.
- The Influence of Heredity and Contagion on the Propagation of Tuberculosis. By G. FLEMING, F.R.C.V.S., HERR A. LYDTIN, and M. VAN HERTSEN. Price 6s.
- Gresswell.** A Manual of the Theory and Practice of Equine Medicine. By J. BRODIE GRESSWELL, F.R.C.V.S., and ALBERT GRESSWELL, M.R.C.S. Eng. Second edition, enlarged. Price 10s. 6d.
- BY THE SAME AUTHORS.
- Equine Hospital Prescriber. Second edition. Price 2s. 6d.
- Bovine Prescriber. Second Edition. Price 2s. 6d.
- Veterinary Pharmacopœia. Materia Medica and Therapeutics. Price 10s. 6d.
- Diseases and Disorders of the Horse. A Treatise on Equine Medicine and Surgery. Price 5s.
- Hill.** Principles and Practice of Bovine Medicine and Surgery, with woodcuts and coloured plates. By J. WOODROFFE HILL, F.R.C.V.S. New edition. [*In preparation.*]
- The Management and Diseases of the Dog. By J. W. HILL, F.R.C.V.S. Third edition. Illustrated. Price 7s. 6d.
- Hoare.** Manual of Veterinary Therapeutics. By E. WALLIS HOARE, F.R.C.V.S. [*In the Press.*]
- Lambert.** The Germ Theory of Disease, Concisely and Simply Explained. By Colonel JAMES LAMBERT, F.R.C.V.S., Army Veterinary Department. Price 1s.
- Liautard.** Manual of Operative Veterinary Surgery. By A. LIAUTARD, M.D., F.R.C.V.S. 600 illustrations. Price 30s.
- Animal Castration. Price 7s. 6d.
- Lameness of Horses and Diseases of the Locomotor Apparatus. Price 10s. 6d.
- Lupton.** Horses: Sound and Unsound, with the Law relating to Sales and Warranty. By JAMES IRVINE LUPTON, F.R.C.V.S. Price 5s.

Miller—Teller. The Diseases of Live Stock, and their most efficient remedies. A Popular Guide for the Treatment of Horses, Cattle, Cows, Sheep, Swine, Fowls, Dogs, etc. By WM. B. E. MILLER, D.V.S., President of U.S. Veterinary Association, WILLIS P. HAZARD, A. LIAUTARD, M.D., F.R.C.V.S., and LLOYD V. TELLOR, M.D. New edition. Price 10s. 6d.

McBride. Anatomical Outlines of the Horse. By J. A. MCBRIDE, Ph.D., M.R.C.V.S. Third edition. Illustrated. Price 8s. 6d.

Meyrick. Stable Management and the Prevention of Diseases among Horses in India. By J. J. MEYRICK, C.B., F.R.C.V.S., Superintendent of Horse Breeding for the Punjab. Price 2s. 6d.

Poyser. The Stable Management of Troop Horses in India. "The Collinsian" Prize Essay. By Major R. POYSER, A.V.D., F.R.C.V.S. Price 2s.

Reynolds. The Breeding, Rearing, and Management of Draught Horses. By RICHARD REYNOLDS, M.R.C.V.S. Price 3s. 6d.

Robertson. A Handbook of the Practice of Equine Medicine. By WM. ROBERTSON, F.R.C.V.S., late Principal of the Royal Veterinary College, London. Second edition. Price 25s.

Smith. A Manual of Veterinary Hygiene. By Captain FREDERICK SMITH, A.V.D., M.R.C.V.S., Professor in the Army Veterinary School, Aldershot. Second edition. Price 10s. 6d.

"The work is a very solid one, and it is a pleasure to recommend it."—*Army and Navy Mag.*

"It should be on the bookshelf of every horseman, horsekeeper, and veterinary surgeon."

—*United Service Gazette.*

— A Manual of Veterinary Physiology. By the same Author. Price 12s. 6d.

"The work will commend itself to those for whom it was written by its conciseness and the able manner in which the important facts are dealt with and arranged."—*Lancet.*

"We offer our hearty congratulation to Captain Smith for his welcome contribution to our scanty professional literature."—*Veterinary Journal.*

"A valuable addition to the too small list of good veterinary text-books."—*Journal of Comparative Pathology* (Mac Fadyean).

"We do not remember to have met with a scientific book which is more readable; and it supplies one of the greatest wants in our literature."—*Veterinary Record.*

"This work ought to delight the heart of the veterinary student."—*Nature.*

Veterinary Diagrams in Tabular Form. With coloured and plain engravings. Size of sheet 28½ by 22 inches.

No. 1.—The External Form and Elementary Anatomy of the Horse. Price 3s. 6d., or mounted on roller and varnished, 6s. 6d.

No. 2.—The Age of Domestic Animals. Price 2s. 6d., or mounted, 5s. 6d.

No. 3.—The Unsoundnesses and Defects of the Horse. Price 2s. 6d., or mounted, 5s. 6d.

No. 4.—The Shoeing of the Horse, Mule and Ox. Price 2s. 6d., or mounted, 5s. 6d.

No. 5.—The Elementary Anatomy, Points and Butcher's Joints of the Ox. Price 3s. 6d., or mounted, 6s. 6d.

Price per set of Five, 12s.; or mounted, 27s.

NOW READY. Price £6 nett.

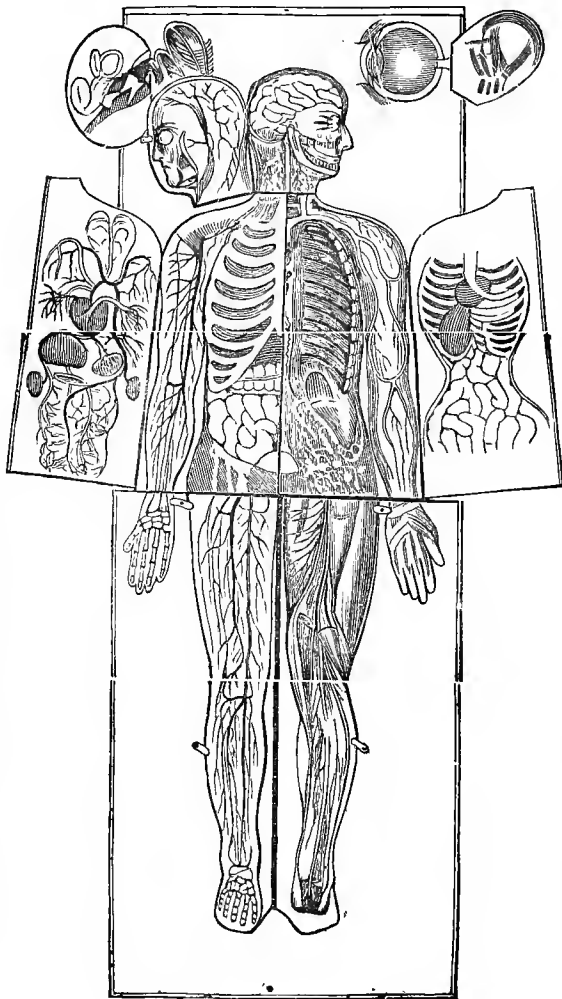
A NEW AND GREATLY IMPROVED EDITION

OF

WHITE'S PHYSIOLOGICAL MANIKIN.

DESIGNED UNDER THE DIRECTION OF

FRANK H. HAMILTON, M.D., LL.D.



This figure shows exact representations of the various parts as they appear in nature, furnishing practitioners and laymen with correct information and a sure guide in all cases requiring an intimate and thorough acquaintance with Anatomy.

It is full life-size, and folds up in a polished wood case, which, when open, forms an easel. The plates are coloured to nature, mounted on linen and varnished.

